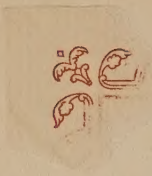

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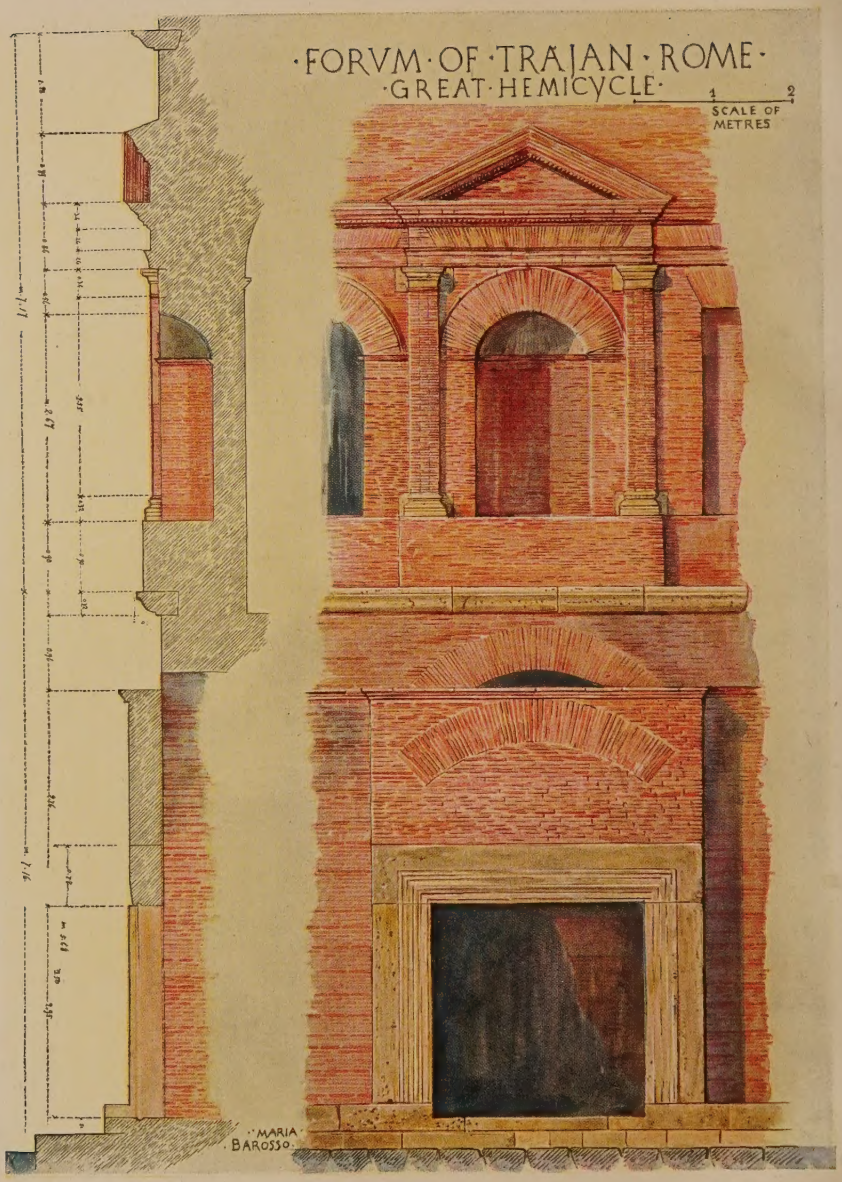
·FORVM·OF·TRAJAN·ROME·
·GREAT·HEMICYCLE·
1
2
SCALE OF METRES
·MARIA·
·BAROSSO·

BRICKWORK

Detail of the Hemicycle, Trajan's Forum, Rome

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CHICAGO
MCMXXV

Detail of the Hemicycle, Trajan's Forum, Rome

The colossal work, completed by the Emperor Trajan (98-117) between the Capitol and the Quirinal Hills, consisted of a Forum proper; the Ulpian Basilica, to which belonged the broken granite columns seen today in the Piazza of Trajan; the famous historical Column, dated 114, at the base of which were the sepulchres of the Emperor and Empress; two Libraries, Greek and Latin; and a Temple to Trajan. The immense Forum, with a double colonnade, was terminated on the east and west by great hemicycles, of which the one on the east remains almost entire, though greatly injured by neglect and the inroads of later buildings.

The aquarelle gives one of the bays of the eastern Hemicycle in elevation and section, very carefully restored, showing the shallow projecting shop fronts on the lower level and part of the superstructure with its windows and niches. The entire Hemicycle is of the finest workmanship, done in a beautiful cinnabar red brick. The windows and niches of the upper story are flanked by pilasters of the Tuscan order, with bases and capitals in travertine, which support an entablature in beautiful brickwork, surmounted by triangular, curvilinear, and broken pediments. Separating the upper and lower stories is an O-G *string course of travertine, below which is seen the arch of the portal and the projecting shop front with its entrance framed in travertine.*

The great Hemicycle is some 65 meters across (213.25 ft.) and has 4 niches and 25 openings. The lower story with its shops is entirely covered under private gardens, except a short stretch at one end. The upper part is visible throughout its entire extent but fallen into bad condition because of the various uses to which it has been put. The Italian government is planning to uncover the Imperial Forums which lie beneath the surface in this part of Rome and thus bring to light this entire Hemicycle which during the Middle Ages, for unknown reasons, came to be known as the Baths of Paolo Emilio.

AMERICAN FACE BR

BRICKWORK IN ITALY

A Brief Review *from* Ancient *to* Modern Times

AMERICAN FACE BRICK ASSOCIATION
CHICAGO
MCMXXV

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By G. C. MARS, *Editor*
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INTRODUCTION

IN ART, as well as in all other forms of human effort, there always develop alongside of each other both conservative and liberal tendencies that are pretty sure at certain points to become respectively reactionary and radical. The conservative very justly appreciates the past and the liberal as justly values the present; the reactionary is as scornful of the present as the radical is of the past. Between the two extremes the Aristotelian mean is the desideratum.

We think of the course of human progress as that of an organic growth or inner development rather than of an outer mechanical construction. Its secret is that of assimilation and not of accretion. Even mutations, such as are revealed in the course of biological development, seem to be the result of stored up past tendencies. So that the history of art presents itself as a living growth out of the past, adjusting itself to the present, and moving toward the future. Both heredity, as past inheritance, and nurture, as present endeavor, must combine in the progress of art.

Quite inadequate, on the one hand, is a tenacious clinging to the past as seen in a mere repetition or slavish copy of the antique, clever and interesting in a way but at best only an indolent imitation and devoid of all originality and fitness to time and place. For, every new environment, every new period, demands and deserves its own forms of expression, which the originating genius of art is especially commissioned to create. And an art that is merely imitative of the past sells its birthright for an easily won mess of pottage. On the other hand, there is the extreme opposite tendency to break away from the past altogether as something backward, outworn, or even pernicious, and to attempt something de novo, *some original creation, resulting in all manner of strained affections or monstrous grotesqueries which may please the groundlings but make the judicious grieve and drive them back to the consolations of the past where, at any rate, there are always to be found forms at once fitting and beautiful.*

At the same time, both the conservative and the radical render a real service if only we can hold a balance between them. The one keeps before us past accomplishments of real value—the priceless inheritances of experience without which we should simply have to do over again what our predecessors have done for us; the other shakes us, often very rudely, out of an indolent inertia, a sort of easy-going, repetitive traditionalism, and compels us not only to consider our present needs but to keep on the open road toward the future.

At any rate, recognizing the vital significance of the past, or the immense value of the historical inheritance for the continued normal development of any art in the present, it has been thought desirable to review briefly the manufacture and use of one of the time-honored constructive materials, the origin of which extends far beyond the earliest recorded history of man, and the application of which promises to grow with the growth of architecture.

As Rome was the mother of modern Europe, from which in turn we in America have received our inheritance, the most natural beginning would seem to be a brief historical survey of the structural and artistic uses of brick, the material under consideration, in the Italian peninsula. By rare good fortune the aid of Italian authorities on the subject has been secured, as indicated by Professor Giovannoni, who has been kind enough to write an introductory preface. The editor, who spent the spring and summer of 1923 in Italy, has gratefully to record not only the cordial assistance rendered by his fellow countrymen, official and other, throughout Italy, but also the charming courtesy and kindly helpfulness of the Italians to whom he applied. A list of all those deserving mention would have no meaning for the American reader, but the generous kindness of Dr. Arduino Colasanti, of Rome, Director General of Antiquities and Fine Arts, must especially be acknowledged, as his introductions opened every door from Sicily to Piedmont.

The plans for the present volume were greatly furthered by the invaluable suggestions and aid of Professor Graham Phillips Stevens, under whose able direction the American Academy in Rome has won a place of marked distinction. With the proper support of American patrons, there is no reason why this fine institution, splendidly set on the brow of the Janiculum, should not win the same distinguished place in the world of art held by the famous Villa Medici, seat of the French Academy, on the opposite Pincian heights. That young American may consider himself indeed fortunate who has the privilege of spending a year or two on the "Hill," where he can refresh and inform himself amid the glories of a classical past while preparing himself for the actualities of the present.

The library of the Academy afforded a happy chance meeting with Dr. Esther Boise Van Deman, whose erudite archeological researches are widely known in the learned world and who generously gave the writer numberless fruitful suggestions on the subject of ancient Roman brick construction, besides introducing him to Signorina Maria Barosso, the artist whose charming work in color is reproduced throughout this volume. Signorina Barosso's connection with the Royal Office of the Palatine and Forum Excavations in Rome admirably fitted her not only to make accurate measured drawings but to

suggest here and there certain restorations that may help to visualize the original work.

Very deeply appreciated is the generosity of Professor Arthur Kingsley Porter and his publishers, the Yale University Press, in kindly permitting the use of illustrations from his monumental work, Lombard Architecture. *Aside from the commercial and official photographs furnished, many excellent special views were secured from Sansaini of Rome, and Cav. Umberto Orlandini of Modena. The translation of the Italian text owes much to the scholarly care of Professor Alfonso de Salvio, of the Department of Romance Languages, Northwestern University, Evanston, Ill. Great credit is also due to the Committee on Publications, Mr. George A. Bass, of St. Louis, Mo., and Mr. Frank W. Butterworth, of Danville, Ill., for their intelligent authorization of the work and cordial support in carrying it to completion. Finally, acknowledgements are cordially made to the engravers and printers for their indefatigable care in cooperating to produce an artistic and craftsmanlike book.*

While the material here presented will prove of especial value to the young architect, it is hoped that it will have some worth also for all those who may in general be interested in every form of cultural development. The traveled reader may be disappointed in not finding here all of his favorite examples of fine Italian brickwork, but he is begged to consider the immense difficulty, or rather impossibility, of doing detailed justice to so broad a subject within the limits of one modest volume.

G. C. Mars, Ph. D.

Chicago, December 2, 1925.

Antefix on Temple
Civitâ Lavinia

PREFACE

THE adoption of constructive and decorative materials, especially brick, in various places and times throughout the history of architecture, depends upon geological much more than artistic or historical considerations. Wherever the development of human civilization has taken place in great river valleys there has arisen an architecture in brick, made possible by the alluvial deposits. When, however, the centers of government and the consequent building activities have been in the vicinity of mountains or rocky formations, the ease of securing the natural material for construction has led to stone architecture.

No better example of such a principle could be given than that of the two oldest civilizations in the world, the Egyptian and the Chaldean. In Egypt the rocky borders of the Nile valley offered the material for the most monumental stone architecture, while clay along the river banks was made into sun-baked bricks for the humbler constructions. In Chaldea, on the other hand, that is, in the immense plains traversed by the Tigris and the Euphrates, the art and technique of burned clay was developed and applied more fully, and attained gradually to a marvelous degree of perfection, until it was used not only as constructive material but also as a means for the transmission of human knowledge.

It is interesting to apply these principles to Italy, a region which, geologically and orographically, is one of the most varied and irregular. Dante's definition:

> "*. . . . . il bel paese che Appennin parte*
> "*E il mar circonda e l'Alpe* . . . . . "*

may be rendered into exact scientific terms. That is, in the north, the Alps, a circle of granitic and calcareous mountains,

*. . . the beautiful country which the Apennines divide and the sea and Alps surround. . . .

form the vast amphitheatre of the Po valley; while the Apennines, dividing the peninsula, project southeastward into the Mediterranean like a great mole, forming a backbone of calcareous mountains, through which narrow river valleys, like those of the Arno and the Tiber, find their way and, leaving fluvial deposits in shallow seas like the Tyrrhenian and the Adriatic, give rise to gently sloping shores of fine sand.

This varied conformation is reflected in an alternate distribution of zones of brick and stone construction. Brick is widely used in the valley of the Po from Piedmont to Lower Lombardy and the Emilia, and also in the sea-coast regions, especially on the Adriatic. Where, however, mountains are near, as in Upper Lombardy, Upper Venetia, Umbria, and most of Liguria, Tuscany, and Campania, stone prevails. Elsewhere, as in Rome, both methods of construction are found.

To such natural and permanent causes, as Taine would name them, are to be added all those mutable influences of civilization and political administration which tend to modify and at times to efface temporarily all limitations. Thus the Roman Empire especially, with its powerful centralized government, its far-flung network of communication throughout the imperial provinces, and with its public service organized upon principles very similar to those of our day, was able at times to superimpose upon the natural conditions of local construction uniform standardized systems, characteristic of the technical and administrative organization of the Empire. Just as the granite of Egypt, either rough or dressed, was brought to Rome, and the pozzolana of Rome and Bacoli was transported everywhere for making strong hydraulic cement, so also, even in regions where stone was common, brick was frequently and systematically used in wall facings for enclosing the plastic concrete conglomerate, in arches and vaults as structural lines of reinforcement, or as decoration on the walls.

These bricks came from the numerous yards, located in the valley zones, where the traditional methods were followed which were perfected in the preceding Etruscan period, technically godfather to Roman practice. It was not, however, in the form

of brick that the early Etruscans developed the manufacture of burnt clays, since quadrangular blocks of limestone or *tufa* were the usual material for walls and vaults, but in the form of external decorations such as antepagments and antefixes, roof tiles, and rich and varied ceremonial vessels, which show a true refinement in both the technical and artistic sense.

When the Western Empire declined and Byzantine architecture advanced in northern Italy and the East, by grafting itself upon the regional schools of Roman architecture, the use of brick became even more extensive than it was at the height of the Roman power. Just as the great organic system of Byzantine construction, both in the disposition of its masses and in the balancing of its static forces, grew out of the Roman vault, so also was derived the manner of employing brick in the wall structure. As Ravenna, Aquileja, Thessalonica, and Constantinople, the great centers in which Byzantine architecture was elaborated, are all in valley or maritime zones, it is natural that brick construction in these centers took on a continually greater development, tending afterwards to spread toward the most distant regions of the Eastern Empire.

In like manner arose the Byzantine style of brick decoration which was applied to cornices and walls. It is easy to find this style, even in relatively late periods, being grafted upon other stylistic forms and contaminating them with foreign additions. For example, in the Roman campanile of the XI to the XIII centuries, the type of brick cornices, projecting saw-tooth fashion on stone brackets, came to modify the composition of the Lombard campanile with its alternate arrangement of parts, or to form the crown of ecclesiastical buildings. In the Church of *San Sepolcro*, of the *Santo Stefano* group at Bologna, the construction, which is of pure Lombard style, nevertheless shows on the exterior walls a checkered decoration of Byzantine origin with its combinations of vari-colored brick.

These, however, are adaptations which are limited, if not altogether isolated, in Italy where, with the exception of a few centers like Ravenna, Milan, and localities in Venetia and Calabria, Byzantine architecture never exercised a dominating

influence. In the rest of Italy, throughout the Middle Ages, there obtained, in construction rather than in decoration, the most localized practice ever known. Moreover, this is a phenomenon typical of medieval architecture in all countries, as Choisy has so clearly shown. The instability of government, the subdivision of territories, the scarcity of technical and financial means, the difficulty of communication, and the insecurity of external relations led almost always to the use of local materials, thus giving to the geological theory the most direct and incontestable application. A few exceptions, as seen in partly completed work, constitute the best confirmation of this principle. Parma began its baptistery with marble imported from Verona, but when war hindered all trade, it continued the construction with its own local brick. Siena did the same in the XIV century when its palaces were at the height of construction.

This phenomenon of the localization in the use of material caused brick to predominate during the Middle Ages in those regions of Italy previously indicated, and to celebrate a veritable triumph in medieval Romanesque and Gothic monuments, such as the cathedrals of Piacenza and Cremona; *San Giacomo*, *San Francesco*, the *Mercanzia*, and the great brick towers of Bologna: *Santi Giovanni e Paolo* and *Santa Maria Gloriosa dei Frari* of Venice; the churches of Verona (with alternating brick and stone courses); the campaniles of Venice, Pomposa, Parma, and Rome; *Santa Maria della Rocelletta* near Squillace; *Sant' Antonio* of Padua; the city halls of Fano and Rimini; the *Broletto* of Milan; the castles of Ferrara, Milan, Pavia, Gradara: and many others.

However, the spread of the prevailing styles in construction and decoration carried with them the new and apparently irrational fact that the forms and the decorations characteristic of stone were often imitated in brick, and sometimes in terra cotta, where the transportation of the more expensive materials was practically impossible. Thus we often find, for example at Parma, Piacenza, Modena, and Bologna, types of cubical capitals executed in brick, vault ribs, window and door frames with mould-

ings carved in brick, as if they were stone, and cornices with small pendent arches, either simple or interlaced, which might be done indifferently either in stone or brick.

Real ornamental terra cotta of delicate pattern and with its own refined and appropriate ornamentation came quite late, more particularly in the XIV and XV centuries. The best examples of it are found in the valley of the Po or neighboring regions, such as Pavia, Bologna, Cremona, and Ferrara.

When at the height of the Renaissance, in the XV century, Italian art definitely resumed classic forms, at first regional in character and timidly ornamental then universal and fully architectural, Italian architecture did not lose the local habit in the use of building materials, so fully established in the Middle Ages. This seeming contradiction is easily explained. The architecture of the Renaissance was no longer an art of sincerity in construction, but one rather of profound aesthetic harmony based upon exact relations among the individual parts and inspired by what Luca Macioli, a writer on aesthetics, calls "the divine proportion." It is natural, therefore, that expression in terms of the materials became secondary, the more so since, because of the changed social conditions of artists and workmen, the technique of the XV and XVI centuries was on a lower average level than that of the XIV century.

Therefore, during this period and also during that of the following XVII and XVIII centuries derived from it, it is always less easy to find architectural and decorative expression that may with exact consistency be called characteristic of brick architecture. There abound multiple geometrical squares or ornamental facings of brick to form a background of the exposed surfaces; and still more frequent than in preceding periods are examples of stone forms executed in brick or, as one might say, the translation into brick of architectural elements meant for stone. Among the most significant examples may be cited brick door and window openings very common in the Marches, as at Macerata and Jesi, in which the brick is carefully cut according to exact patterns; or the brick columns so common in the architecture of Borromini in Rome; or the façades of XVII century

Piedmont palaces at Turin, Mondovi, Asti, etc., where brick is used in the massive projecting coigns as well as in all the windows with their ornate and twisted carvings of the Baroque style. There are even examples, as in the vestibule vaults of the Royal Palace at Alessandria, in which the virtuosity of the artisans carving the brick went so far as to imitate rich stucco decoration. But, aside from these exceptional examples, it is precisely the advance of stucco technique that marks the end of decorative architecture in brick, as a means of current expression.

From the XVII century on, buildings entirely of brick, in which the exterior indicates the interior construction, are more easily found in modest country structures, in which also there is so much artistic vitality and such possibilities of greater aesthetic development than in the more pretentious houses, administrative buildings, or churches of the cities where often the fictitious outer forms, concealing the inner structure, are no longer treated with refinement.

Coming to the XIX century and the present time, we find that there are not wanting adaptations of brick architecture to new themes, in which experiments and attempts are made at obtaining a modern organic expression, both in the ease of execution on the wall surface — a positive aesthetic element which always has a high value — and in the more or less direct relation between technique and form. At times, these architectural experiments turn to the past and seek to draw from it, either by imitation or free treatment, new elements of beauty. At other times, the designer adheres to a pure constructive simplicity or else, by the use of other ornamental means in majolica, graffito, terra cotta, and mosaic, seeks to obtain combinations of entirely new effects. However, as in the modern architecture of all countries which have been disturbed by the too rapid changes and the consequent possibilities of new developments, there is wanting a true unity of direction which has the force of a real style beyond the vagaries and oscillations of a passing fashion.

By adhering to the real nature of a material and the proper uses inherent in it, as may be done in brick architecture, perhaps

it may prove less difficult to find the clue to a rational architectural expression. To this end, the present time is especially favorable when the great improvement in manufacturing technique, afforded by mechanical progress, makes it possible to utilize the plastic qualities of clay to the best advantage in obtaining uniform and standardized elements for use in wall surfaces where varied patterns may be combined in decorative effects. Besides, the developed means of communication which characterize our cinematic civilization permit, for the first time since the days of the Roman Empire and in a much more efficacious manner, the breaking up of localization in the use of materials, and further the distribution of manufactured products over an extensive territory.

For this reason, therefore, it may prove interesting and useful, not only for cultural reasons but also for those of a practical artistic production, to review the various stages of the path traversed and seek out the continuity of Italian brick architecture through successive examples from ancient to modern times. In the complex life of a civilization, as in that of an enduring and famous architecture, the study that takes into account the evolution of one element and relates to it its various manifestations, as to a common denominator, is a method always productive of fruitful results. Up to the present, no such study on the subject of brick has been made in the field of Italian architectural tradition, a field, however, which has been the object of many investigations to establish stylistic classifications, to determine regional characteristics, or to illustrate individual accomplishments of distinguished artists.

The present work, entrusted to two young scholars, Professor Carlo Roccatelli for the Ancient and the Renaissance periods, and Professor Enrico Verdozzi for the Medieval and Modern, follows the method indicated above but does not claim to be exhaustive. Its aim is to collect a number of examples, chosen from among the most notable and significant to be found in the different epochs of Italian art, and to provide them with an illustrative treatment, partly synthetic and partly analytic, which will set forth the peculiar characteristics of each example and

trace the main lines of brick technology and art during the respective architectural and constructive epochs.

A complete treatment of the subject would require much more space and time. Yet, although limited, the present work throws light on monuments which are still imperfectly known and in some of their details completely unedited. By systematic association of ideas and by enriching the historical with the technical and artistic conceptions, the work will perhaps make a not inconsiderable contribution to the progress of our knowledge of Italian architecture in the past, as well as aid in the determination of new rational affirmations which will graft upon its trunk young and sturdy shoots.

As to bibliography, the treatises on the subject of Italian brick architecture, both as to construction and decoration are, up to the present time, few and incomplete, all of them with different aims and only incidentally dwelling on the present theme. Among the few works which deal with the technique and the technology of Italian brick in the various regions may be mentioned: G. Revere, *I Laterizi*, Milan, 1907; *Enciclopedia italiana delle arti e industrie*, under the word *Laterizi;* Formenti, *La pratica del fabbricare*, Milan, 1893-95, which treats also of the various earths, etc.; Salmoiraghi, *Materiali naturali da costruzione*, Milan, 1904.

Of special interest among the publications which treat of the structural and decorative application of brick, during the various periods of Italian architecture, is the treatise of Runge, *Beiträge zur Kenntniss der Bachstein-Architektur Italiens.* Leipzig, 1884; special mention must also be made of Gruner, *Terra Cotta Architecture of North Italy*, 1867; Strack, *Ziegelbauwerke des Mittelalters und der Renaissance in Italien*, Berlin, 1889; Street, *Brick and Marble in the Middle Ages*, 1874.

Other data on the subject dealing with Italy may be found in chapters, or in sporadic treatment, in works of a more general scope; in treatises on architecture like those of Cloquet, Gaudet, and Milani; and in studies dealing with styles like Archinti, *Gli stili dell' Architettura*, Milan, 1900; Cummings, *A History of Architecture in Italy from the Time of Constantine to the Dawn of*

the Renaissance, Boston, 1901; Arthur Kingsley Porter, *Lombard Architecture*, 1912; Durm, *Baukunst der Römer* and *Baukunst der Renaissance in Italien*, 1898; Parker, *Archeology of Rome*, etc.

There may be consulted also Verdier et Cattois, *L'architecture domestique au Moyen Age;* Gailhabaud, *L'architecture du v-e au xviii-e siècle et les arts qui en dependent;* Melani, *Manuale d'arte decorativa antica e moderna*, Milan, 1907; Anderson, *Examples of the Municipal, Commercial, and Street Architecture of France and Italy*, 1877; etc. In the field of publications of a general character pertaining to brick from the decorative point of view, Chabat, *La brique et la terrecuite* (Etude Historique) Paris, 1881-90; Lacroux et Detain, *Construction en briques*, Paris, 1886; etc., will prove of interest. Fuller bibliographical particulars dealing with the subject from a stylistic and historical point of view will be found in the notes of Roccatelli and Verdozzi.

Comm. Prof. Gustavo Giovannoni

Engineer and Professor of Architecture, Royal School of Applied Engineering; Professor of Restorations, Superior Royal School of Architecture; Member of the Superior Council of Fine Arts.

Errata

p. 23, l. 16	*for* 2.2	*read* 3.2
p. 39, l. 24	*for* 25	*read* 26
p. 45, top	*for* MIDDLE AGES	*read* ANCIENT TIMES
p. 46, l. 7 in note	*for* parapetted	*read* parapeted
p. 54, l. 11	*for* Fig.	*read* Figs.
p. 54, l. 21	*for* size	*read* length
p. 54, l. 24	*for* Imole	*read* Imola
p. 57, l. 4	*for* San	*read* Sant'
p. 57, l. 7	*for* 1.8	*read* 1.6
p. 94, l. 16	*for* delle Erbe	*read* dell' Erbe
p. 222, last l.	*for* Borbini	*read* Borboni
Plate 19, l. 8	*for* Paletine	*read* Palatine
Plates 35 and 39	*for* Peranesi	*read* Piranesi
Plate 89, l. 8	*for* Giovannie	*read* Giovanni
Plates 120, 122, 127	*for* Sepulcre	*read* Sepulchre
Plate 142	*for* Gaete	*read* Gaeta
Plate 146	*for* Cappocci	*read* Capocci

MARIA BAROSSO
ROMA MCMXXIV
ROMAN TOMB THE SO CALLED
OF THE POETA PERSIO
VIA APPIA
VIA APPIA
0 1 2 3 4
SCALE OF METRES

Plate 1

Tomb of the Poet Persius, Appian Way, Rome

Tradition has attributed this tomb to the poet Aulus Persius Flaccus, because his death is mentioned by a historian as having occurred at his villa on the Appian Way between the VIII and IX mile stones. As the text indicates, doubtless some other person of like name is thus commemorated.

The tomb is set back a dozen feet from a pavement laid along the public way as was the custom when a tomb had an interior. In this case, the interior chamber is covered by a cross vault some 15 feet above the old pavement, now wanting. The exterior has been partly restored in recent times, and the artist has ventured, from careful measurements of remaining parts, to represent the tomb as it would have appeared when first built eighteen centuries ago.

The probable height of the monument with entablature and pediment was 29 to 30 feet, including the lofty stylobate of 14 to 15 feet. The quadrilateral plan is slightly over 14 by 17 feet. The brick facing of the stylobate is very fine, with mortar joints of lime and gray pozzolana not over an eighth of an inch in thickness, while ten courses, on an average, barely measure one foot. The upper part does not seem to be so well done.

The superstructure, above the basement cornice, consists of corner pilasters, two round columns set in semicircular recesses—the one on the right having disappeared—and a large central canopied niche for the statue of the deceased. The pilasters and columns, resting on attic bases, are of the Corinthian order and rise nearly nine feet to a fragmentary entablature which is supposed to have supported a pediment.

The prevailing tone of the brick is yellowish, varied to a yellowish and clear red, altogether representing Roman brickwork when it was still at its best.

Ancient Etruscan Frieze in Natural Terra Cotta

BRICK IN ROMAN ANTIQUITY

Manufacture and Sizes

THE very serious deficiencies in the study of ancient art and technique, and still more the prejudices and false premises which have guided scholars up to the present, do not permit of obtaining clear and reliable information regarding brick manufacture in antiquity. The numerous, though unfortunately ill-preserved, remains of Etruscan, Latin, and Campanian constructions prove that brick and especially architectural terra cotta were in use before the VI century B. C.

The discovery of ancient dies used in preparing the ornamental terra cotta of the ancient Italic temples (*di Vignale, dei Sassi Caduti*, etc.),[1] and the examination of the material itself, lead us to believe that brick, tiles, and terra cotta were made by means of moulds and dies, and dried and burned by a process differing little from that of today, leaving out of consideration, of course, the use of modern machinery and kilns.

An important observation, made by Della Seta,[2] and easily verified by a direct examination of the materials, is that, as far back as these times as well as later throughout the entire Roman period, pozzolana* was used with clays as a reducing material for burned bricks and, according to Marcus Vitruvius Pollio, chopped straw for bonding in sun-baked bricks.

*A siliceous volcanic dust containing ferric oxide, alum, chalk, and magnesia, deriving its name from Pozzuoli, near Naples, where it was first utilized; afterwards found in great beds on the Roman Campagna. Vitruvius gives an interestingly curious account of it in II, 6 of his treatise. Mixed with lime and water it makes a strong, enduring cement. [*Ed.*]

1. Weege: *Führer durch die Säm. Klass. Altertümer in Roma*, II, p. 341.
   Della Seta: *Museo di Villa Giulia*, pp. 182-187.
2. Della Seta: op. cit., p. 128.

Vitruvius, who flourished in the days of Julius Caesar and Octavianus (Agustus, to whom he dedicated his work, *De Architectura*), does not give us much information concerning the manufacture of brick. He says only[1] that there were in use *lateres*, that is, sun-baked bricks, and *lateres cocti* or *testacei* which were burned. He does give us, however, a list of the various types of brick then in use, and also their dimensions. They are the so-called Greek *Lydium*, one by one and a half feet* (Fig. 1); the *Tetradoron*, a brick four palms square; and the *Pentadoron*, five palms square†. It is evident from these names that the practice in brickmaking among the Romans was at first greatly influenced by the Greeks, although their own practical genius subsequently introduced many other sizes and forms.

Aside from the three types of brick just mentioned, Vitruvius further speaks of half-bricks[2] in a passage much discussed by scholars up to the present day, since it may be inferred that the bricks were cut into halves, either along a line parallel to one side, thus obtaining two rectangular bricks, or along a diagonal line, giving two triangular bricks. The latter might easily be inferred from the immense quantities of triangular brick found in Roman construction. But the question of Vitruvius' meaning may be considered as solved when we call to mind that the use of triangular brick first appeared in Rome with the constructions of Claudius (41-54 A. D.) and hence at a period later than Vitruvius. Besides, Ortiz y Sanz[3] observes that if Vitruvius had had in mind triangular bricks, he would have called

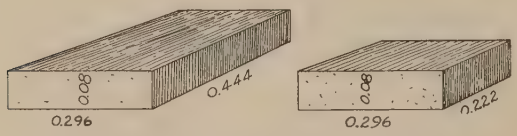


Fig. 1. Roman Brick, the *Lydium*, after Rivoira.

*The Roman foot usually given as 29.6 cm. or 11.6 inches. The *Lydium*, according to Vitruvius, was commonly used by the Romans. The Greeks used the *Pentadoron* for public and the *Tetradoron* for private buildings. [*Ed.*]

†Rivoira gives the dimensions of the *Pentadoron* as one and a quarter feet, the foot taken as 30.9 cm. [12.17 in.]. This makes the "palm" 7.7 cm. [3.03 in.] and consequently the *Tetradoron* 30.9 in. or a fraction more than the Roman foot as previously given. Vitruvius does not indicate the thickness of the brick but Rivoira refers to a *Pentadoron* used at ancient Medma in the Campagna that measured in thickness 9 cm. or 3.54 in. He also refers to Roman brick one foot long, a half foot wide, and a quarter foot thick as surmised by certain writers on the subject (*Architettura Romana* p. 21). [*Ed.*]

1. Vitruvius: I, 5; II, 3-8; V, 10; VII, 4; VIII, 3. 2. Vitruvius: op. cit., II, 3.
3. Oritz y Sanz: *Los diez libros de Architettura de M. Vitruvio Pollion.* p. 33.

them *lateres trigones* and not *semilateres*.* In addition to the above mentioned bricks, Vitruvius refers also to the *laterculi besales*, bricks about eight inches square, or two-thirds of a foot.[1] But, aside from the data furnished by Vitruvius, we may be sure that brick dimensions were variously modified throughout the long centuries of Roman civilization.†

FIG. 2. Vitruvian Bond, after Reber in Morgan's "Vitruvius."

Besides brick, very naturally, tiles were manufactured for roofing, both curved and flat, the dimensions of which varied from 38-77 cm. [15-30 in.] in length and from 28-56 cm. [11-22 in.] in breadth (Fig. 3). Especially in the I and II centuries A. D., not infrequently, brick were used which had been originally manufactured as flat roof tiles and afterwards transformed into bricks by cutting off their edges and smoothing them on slabs of stone. The

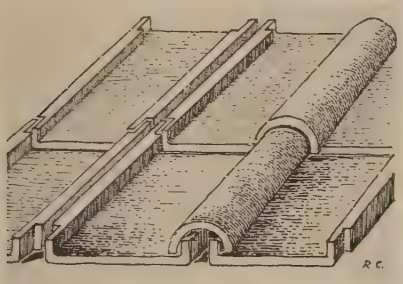


FIG. 3. Roofing Tile.

*In Book II, Cap. III, 4, Vitruvius tells us clearly how the whole and half brick (*semilateres*) were used in bonding. In the same course, the whole brick are laid on one face of the wall and the half brick on the other. In the next course this order is reversed and so on alternately, at the same time breaking the vertical joints as in modern brickwork. "This lends strength," he adds, "and a not unattractive appearance to both sides of the wall" (Fig 2). In the following paragraph he commends the Greek practice in stone work which is similar to the well-known method of bricklaying, and that is "to bind the upright joints by interchanging the direction of the stones as they lie in the courses. Thus they attain to a perfection that will endure to eternity." [*Ed.*]

†As illustrating the great variety of brick sizes used by the Romans, may be cited the following examples, the dimensions being given in centimeters (cm. = 0.3937 in.): Forum at Pompeii, 2.5 x 26 x 12 (1 x 10.3 x 4.7 in.) with arch brick 38 long (15 in.); Museum at Palermo, 10.5 x 34.5 x 18 (4 x 13.6 x 7 in.); Greek Theatre at Taormina, 5-10 x 28-49 x 14-35 (2-4 x 11-19 x 5.5-13.8 in.); Greek Theatre at Catania, 5-8.5 x 48-52 x 35 (2-3.4 x 18.9-20.5 x 13.8 in.). At Girgenti the fragment of an old pavement is seen laid herringbone fashion with very small brick 2 x 15 x 7 (0.8 x 5.9 x 2.8 in.) antedating, it is thought, the same sort of work in the Roman Forum. In Rome, every size is found from the very small brick just mentioned to the enormous 60 cm. *bipedales* (two feet). The thickness, however, does not average much over an inch and a half, running from 2.5 cm., hardly an inch, as found in the beautiful red brick of the Columbaria on the Latin Way, to 6 cm., something over two and a third inches, as found in Hadrian's Villa. The thick brick of the Greek Theatre at Taormina are again found at Ravenna in the tomb of Galla Placidia of the V century, where they measure from 9 to 10 cm. in thickness (3.9 in.), as well as later in some examples of the Middle Ages. See foot note, page 47. [*Ed.*]

1. VITRUVIUS: op. cit., V, 10.

use of these *tegulae fractae* [broken tiles] is supposed to have originated from the convenience of utilizing the material gathered from the ruins of great fires from which Rome suffered not a little.*

From the times of Claudius, and during the following centuries, triangular bricks were much used. They were obtained by cutting the above-mentioned *laterculi besales*, before burning, along a diagonal line, thus producing bricks approximately 20 x 20 x 30 cm. [7.9 x 11.8 in.] and then bisecting these last, giving a size of about 15 x 15 x 20 cm. [5.9 x 7.9 in.] as shown in Fig. 4. On the dimensions and uses of brick in antiquity, we have today much information and detailed classification; but attempts to give this a strictly chronological value must be regarded with great reserve.[1]

An interesting peculiarity found in Roman brick and tile, from the middle of the I century on, and which undoubtedly originated in the Orient, is the seals or trade-marks impressed upon them (Fig. 5). These marks, besides possessing a very

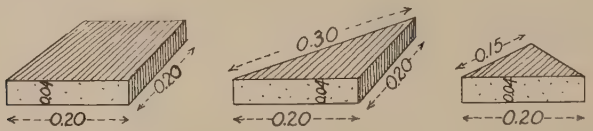


Fig. 4. The Laterculi Besali, cut into triangular bricks, after Rivoira.

great chronological and topographical interest, often reveal the source from which the clay was taken, and the place and date

*Although kiln burnt brick at Rome began to be made in the Sullan period (138-78 B. C.) they did not gain wide and exclusive use until the days of the early Emperors. But though up to this time vast quantities of sun-baked or adobe brick were used for building, the roof tiles were necessarily kiln burned to endure the weather, in consequence of which floods or conflagrations left them still usable as building material. Vitruvius made the test of well burned brick, their use on a roof where they are "exposed to bad weather and time" (Book II, Cap. VIII, 19). In view of their durability it was natural that roof tile should be utilized in reconstructions, for the entire surface of the wall, instead of adobe brick. It was natural also that, aside from safety in drying and burning, the thinness of the tiles used for facing walls should establish a practice for the subsequent manufacture of the long thin Roman brick. Perhaps it was the structural use of the salvaged flat tile that led to the manufacture of the large standardized square brick known as *sesquipedales* (45 x 45 cm., a foot and a half) and *bipedales* (60 x 60 cm., two feet), the latter used extensively for bonding the wall and for arches. [*Ed.*]

1. Van Deman: "Methods of Determining the Date of Roman Concrete Monuments" in the *American Journal of Archaeology*, second series, 1912, Vol. 16.
J. T. Parker: *De variis structurae generibus praelectio.*

of manufacture, etc.* They were of various forms—circular, semi-circular, crescent-shaped, or rectangular—and testify by their great variety how numerous the brick factories must have been.[1]

Brick in Construction

The use of brick construction in Roman antiquity, contrary to what a superficial observer might believe, was very widespread, indeed one might say almost general (Plates 2-6). Passing by the well known, venerable monuments of Roman art, the notable character of which demanded in their exterior forms the use of stone and marble, let us seek rather to obtain a close view of the familiar life of Rome by turning our attention to those elements which, up to our day, have been so much neglected as to seem foreign to the classical world as known to us.

Size, 5.5 x 32.5 x 16. cm. (2.2 x 12.8 x 6.3 in.)

Size, 10.5 x 34.5 x 18. cm. (4.1 x 13.6 x 7.1 in.)

Courtesy of Comm. Prof. Ettore Gabrici, Director National Museum of Fine Arts and Antiquities, Palermo.

Fig. 5. Trade marks on Brick.

In fact, by observing the humbler class of buildings, those in which the activities of every-day life were carried on, those quarters of the ancient city inhabited by the middle class, by merchants and workmen with their houses, shops, and taverns, where in short pulsed the real life of antiquity, we experience a complete transformation of the idea we had formed of ancient architecture by our observation of stately temples and sumptuous public edifices.

*M. Ch. Descemet—*Inscriptions Doliares Latines*, Paris 1880—shows brick stamps with consular dates from 76 B. C. to as late as 554 A. D., although nearly half of them belong to Hadrian's time. Marini's list, contains 5000 inscriptions and yet is not exhaustive. This practice was found in Italy outside of Rome as early as 75 B. C. but not in Rome itself before the days of Trajan. These stamps are very diverse and variously indicate: the owner of the clay pit; the factory where made, perhaps its owner; the date; the merchant that sold them; the destination; the construction served; or a claim of quality. Sometimes the center of the stamp bore a head of Mercury, an ox skull, the figure of an animal, a bird, an insect, or a palm leaf. See Dennie, *Rome of Today and Yesterday*, Putnam's, New York, 1910, p. 281 ff. [*Ed.*]

1. A collection of these stamps, showing great erudition, is that of Gaetano Marini, *Iscrizioni antiche dolari*, published under the direction of G. B. De Rossi, Rome, 1884. Cf. also the *Corpus inscriptionum latinarum*, Vol. XV. Parker, op. cit.

PLATE 2. Greek Theatre, Taormina, Sicily.

PLATE 3. Great Arch of Theatre Entrance, Ostia.

PLATE 4. Fluted Brick Columns, Great Basilica, Pompeii.

PLATE 5. Round Brick Column, Forum, Pompeii.

Courtesy of Comm. Prof. Vittorio Spinazzola, Naples, Supt. of Monuments, etc., for Southern Italy.

PLATE 6. Elliptical Brick Columns, Porticus Tullianus, Pompeii.

The excavations at Ostia, even more than those at the less commercial and more tranquil Pompeii, shed great light upon the subject. We see in fact how general was the use of brick and how it afforded many solutions in construction and admirable decorative effects, while the use of cut stone was, as today, only an exception.

And if the evidence of ancient constructions themselves is not sufficient, Vitruvius reminds us of their value,[1] by praising the structures of brick as worthy of being the dwellings of kings. While burned brick were used in buildings within the city of Rome, he tells us why sun-baked brick should not be used and then gives rules for their use in construction outside the city. Dion Cassius[2] informs us of the disastrous effects of the inundations of the Tiber upon the many buildings of sun-baked brick, and finally Suetonius[3] relates how Augustus was able to boast that he had received a Rome of brick but had left it one of marble.

Going back to origins, we find, as one of the very first known examples of brick construction, the Etruscan walls of Arezzo, mentioned by Vitruvius (*in Italia Arretio vetustum egregie factum murum*), built of burned brick with the facing so well executed as to cause Caporali[4] of Perugia to write in 1536, nearly two thousand years after its construction: "Arezzo possesses a wall of brick so excellently worked by hammer and laid that one can hardly see the mortar joints between them; moreover the brick are so well burned that the color is absolutely uniform." All this proves, at least indirectly, how widespread was the use of brick before the days of the Empire, and suggests how important had been both Greek and Tuscan influence.

Walls

Without going into a too minute chronological analysis, let us examine the use of brick in the various types of wall structure. In the construction of bearing walls,[5] the Romans certainly did not have a uniform type either at a given period or in a given locality. If up to the close of the I century B. C. Hellenistic

1. Vitruvius: op, cit. II, 8. 2. Dion Cassius: *Storia Romana*, XXXIX, 61.
3. Suetonius: II, 28. 4. Rivoira: *Architettura Romana*, p. 3.
5. G. Giovannoni: *Costruzione ed ingegneria presso i Romani.*

and Etruscan tradition led to the frequent adoption of wall construction in squared stone, nevertheless, the peculiar methods adopted by the building crafts soon caused the widespread use of walls built of a conglomerate enclosed between facings of other material, a type which became characteristic of Roman construction. The great thickness of these walls made possible the rapid execution of the work and a marked economy. While the master masons, with care and skill, built the exterior surfaces of brick so as to form a sort of encasement, the common laborers carried on the work of filling in the *caementum*, a conglomerate formed of successive courses of mortar and rough unshaped stones which were tamped down as the work progressed.*

This type of construction, however widespread its use, is not to be regarded as the only one known. In fact, there are not wanting examples of walls, of no great thickness, built entirely of brick; and walls of mixed masonry, as well, consisting of brick and dressed stone.

The remains of pre-Augustan constructions, unfortunately not very noteworthy, are the first examples of the *caementum* wall construction.[1] At first, we see appear the so-called *structura testacea*, a wall faced on both sides with broken tiles, smoothed on the outer edge after chipping off the flanges, and filled in with *caementum* between the two facings, without transverse brick bonding courses (Fig. 6). The bonding of the interior nucleus to the exterior brick facing was entrusted to the good quality of the mortar and to the rough irregular inner surface of the broken

*This *opus caementum* so called, was rough work of broken stones, pieces of brick and tile, and later even fragments of marble, laid more or less irregularly in a plentiful supply of pozzolana mortar. Vitruvius, who did not know its complete development, condemned its use in his day, as compared with the sounder Greek practice (Book II, Cap. VIII, 7). It is not difficult to conjecture that the practical Roman builders, recognizing the durable solidity of the *caementum* work, soon learned to economize both in material and time by saving the stone for the outer surface of podium or wall which in the mass could be done more quickly and cheaply in the *caementum* work, and done enduringly, in spite of the Vitruvian dictum. In a sense, the extensive pozzolana beds of the Roman Campagna made imperial Rome possible. This *opus caementum*, bonded through its thickness and protected at angles and around openings by brick, needed surfacing or a *cortina* (curtain) either for appearance or for a better surface to take the plaster. Hence marble, stone, small tufo blocks (in case of *incertum* or *reticulatum* work) or, most extensively of all, brick were used for facing. While the stone facing was sometimes plastered, it was in the main to the tufo and brick surfaces that stucco was applied, though many examples of fine brickwork are found which the original builders meant to be exposed because of its finished beauty. [*Ed.*]

1. G. Giovannoni: op. cit.

brick or tile. We have an example of this type of construction in the tomb of the Platorini[1] of the Republican period, reconstructed in the National Museum at Rome. The borders of openings, and angles of walls, however, were built entirely of brick.

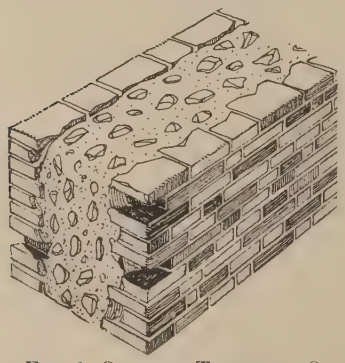


Fig. 6. Structura Testacea or Opus Testaceum

Under Tiberius (14-37 A. D.) this construction appeared in an improved form; the two faces of the wall were bonded together, depending on the building or the builder, all the way from every fifth up to every seventeenth course by large square bricks, the *tetradoron* or *pentadoron*. Examples of this work may be found at Rome in the *Domus Tiberiana* on the Palatine (Fig. 7), and in the walls of the *Castro Pretorio* in which latter we have also a first example, although a very simple one, of face brickwork with decorative cornices, loopholes, and battlements (Fig. 8).

The external facing, however, was much more commonly built of triangular bricks with the apex laid inward, thus making an excellent bond with the internal *caementum* nucleus, which was then crossed at regular intervals by horizontal courses of large bonding bricks or tiles through the entire thickness of the wall (Fig. 9). The use of these triangular bricks, beginning in the times of Claudius as already noted, spread widely; for, besides offering a better bond with the nucleus and a more uniform appearance on the wall face, it obviously afforded greater economy of material.

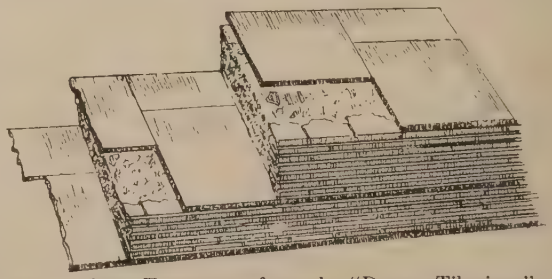


Fig. 7. Opus Testaceum, from the "Domus Tiberiana" on the Palatine, Rome, after Rivoira.

1. Paribeni e Berretti: *Bollettino d'Arte del Minestero della Pubblica Istruzione*, 1911, folio X. Lanciani: *Notizie Scavi*, 1880, p. 127; 1883, p. 372.

Another type of wall structure was the *opus reticulatum** in which, however, brick played only a small part. Here the facing on the *caementum* nucleus was made up of little cubical blocks of tufo laid with the sides at 45° to the perpendicular. At intervals there were framing squares of brick, and brick projections, corners, architraves, arches, and the like. This type of construction was in use from the time of Sulla (138-78 B. C.) to that of Hadrian (117-138 A. D.) after which it quickly disappeared. Although this type of wall was almost always covered with architectural decoration in cut stone or stucco, it presented nevertheless when exposed, quite a pleasing and decorative appearance (Plates 7-8). Many very beautiful examples of it are in existence, among which are several tombs of the time of Claudius at Ostia.

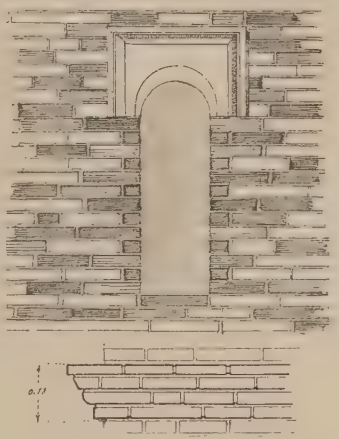


FIG. 8. Loophole and Cornice, Castro Pretorio, Rome.

Passing over other related types of wall, which have no direct bearing on our subject, we finally mention however the *opus mixtum*. This form of construction is composed either of alternate courses of brick and squared stone (Fig. 10), a type which appeared after Hadrian and developed very greatly in the age of Constantine, or of brick and cobble stones laid herringbone fashion, *opus spicatum* (Fig. 11), a type quite common in Northern Italy.

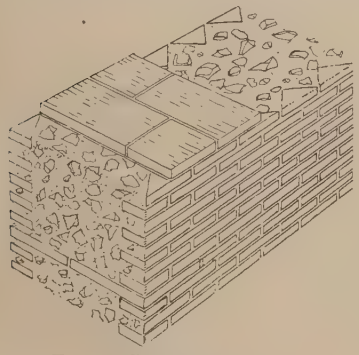


FIG. 9. Triangular Brick and Structural Bonding.

*This *reticulatum* manner doubtless was a development, on aesthetic grounds, of the *opus incertum*, irregular work (or *insertum*, inserted work), of the late Republic, in which the small tufo pieces were introduced irregularly after the fashion of rubble work. The latter, Vitruvius regarded more durable than the *reticulatum*, though not as attractive. Book II, Cap. VIII, 1. [*Ed.*]

Arches

Not entering into a discussion of the form of arches, almost always semi-circular or segmental, we note first of all that their construction was directly connected with that of the wall and took on rather an external organic expression. Brick arches were generally built of *bipedales*, the larger tile-like brick two feet square, and show more or less careful workmanship. At times, in order to obtain perfect execution and to make the mortar joints uniformly thin throughout the entire face of the arch, cuneiform or wedge-shaped bricks were used, as in the Colosseum. In arches of considerable size or subject to heavy weight, it was customary to adopt the double concentric type of arch which permitted a better and more regular adjustment of the wall mass. Characteristic examples of these arches are found in the Pantheon, in the Basilica of Maxentius,* and elsewhere (Plates 9-14).

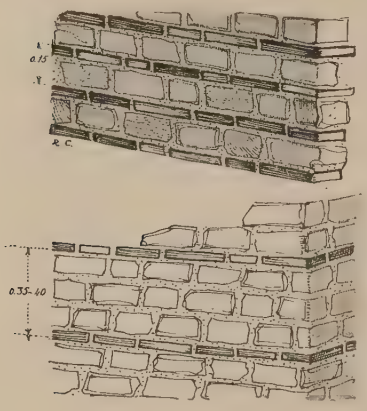


Fig. 10. Opus Mixtum.

More often arches were of a mixed construction, brick upon the faces and concrete in the interior. Then almost always the nucleus of concrete had at intervals *bipedales* or *sesquipedales* in horizontal courses set radially, which bonded together the two external arch faces; or perhaps, in addition, there were other arches in the interior of the nucleus, always bonded together by large tiles, thus forming a network of brick compartments into which the *caementum* was placed (Fig. 12). In this manner the interior forces were distributed and the curve of pressure fixed. One of the first examples of this type of construction is that of the Claudian arches† on the Caelian Hill at Rome[1] (Fig. 13).

*This structure was modified and completed by Constantine, the victorious rival of Maxentius, and hence is generally known as the Basilica of Constantine. [*Ed.*]

†As Nero completed and extended the Claudian aquaduct for his Golden House, these arches are frequently named the Neronian Arches. [*Ed.*]

1. Lanciani: *I commentari di Frontino,—atti della R. Accademia dei Lincei*, Series 3, Vol. 4. pp. 364-374. Choisy: *L'art de batir chez les Romains.*

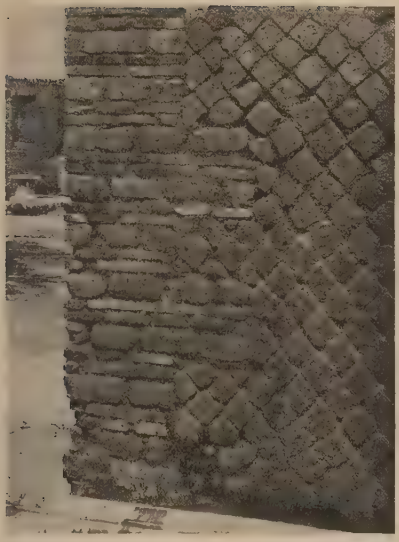


PLATE 7. Corners of Opus Mixtum with Reticulatum Wall, Pompeii.

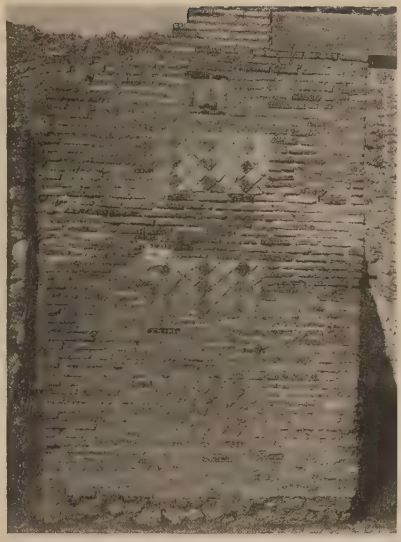


PLATE 8. Brickwork Ornamented with Reticulatum, Pompeii.

Another use of brick may be mentioned as a typically Roman architectural motive and that is string courses or architraves combined with semi-circular relieving arches, and also relieving arches incorporated in the wall structure, either to concentrate the stresses at determined points of the foundations or to obtain a better and more uniform adjustment of the wall mass. Of these we have any number of examples (Plates 15-18).

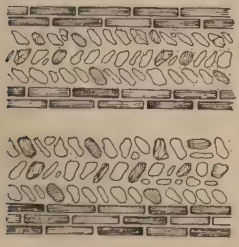


FIG. 11. Opus Spicatum

VAULTS

The vault, a typical element of Roman architecture, of which it forms the principal characteristic, was always the object of assiduous care and study on the part of the ancient builders. In it we see brick assume a great and special importance because of its varied and ingenious applications. The typical construction of the Roman vault was already described[1], of the nature of the *caementum* work, which suited admirably the organization

1. GIOVANNONI: op. cit.

of Roman labor and in which we may easily recognize the archetype of our modern concrete construction.

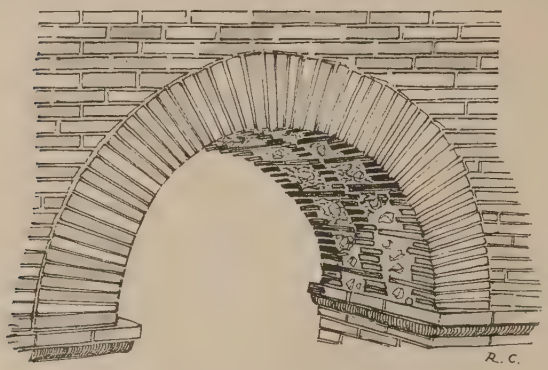


Fig. 12. Arch Faces Bonded with Bipedales

To the unquestionable advantages of this system—economy and rapidity of construction—were opposed the inconveniences which arose from the necessity of using strong supports during construction and from the dangers due to even the slightest settling of the foundation which would cause immediate and very serious injury. However, builders strove constantly to eliminate these disadvantages, and the history of this construction offers numerous expedients devised for this purpose. One of the most common of these aimed at the elimination of the complicated wooden centering which necessarily had to form a continuous and complete support, held up by very strong braces. It consisted of a vault or casing of brick laid flat, alternating from time to time with brick laid on edge, and bonded with quick-setting mortar so as to form a sort of template which, besides giving the form of the vault, supported the layer of concrete with which it at once bonded. (Fig. 14.)

Fig. 13. Double Ring Brick Arch, Claudian Acqueduct, Rome.

The first examples of the kind known, we have in the Colos-

MARIA BAROSSO · ROMA · 1923

Plate 9

Basilica of Constantine or Maxentius, Rome

Imagine a great quadrangle 83 feet wide and 265 feet long, flanked on either side by three immense arches of 76 feet span, opening into side aisles 56 feet wide, and covered by a stupendous barrel vault 120 feet above the pavement, and you get an idea of the enormous structure adjoining the Roman Forum which is generally known as the Basilica of Constantine. It was really built in 306 to 310 by Maxentius, but taken over and altered to his purposes by Constantine after the defeat of Maxentius. It was built according to the Roman method of the period, a brick facing on a caementum core, the walls being covered with marble and the coffers of the great barrel vaults finished with gilded stucco.

The entire right or north aisle remains, the two apses in part, part of the portico, and fragments of piers. It has been studied in every age, and has had an influence on the building of such great structures as St. Sophia's at Constantinople and St. Peter's at Rome.

In the aquarelle, we see part of the right aisle with its coffering, and in the background the portico arcade, the campanile of Santa Francesca Romana *and its later baroque façade. The aisle is divided into three compartments each of which is 76 feet long and covered by a barrel vault which runs at right angles to the nave. The three compartments communicate by means of great arched openings flanked by low niches. The barrel vaults are nearly 76 feet in span, and rise 80 feet above the pavement to the key of the arch. There are five coffers in each of the twelve horizontal rows that cover the vault. The coffers, each of which is over 8 feet across, consist of recessed octagons and are separated laterally nearly two feet, with small rhomboid coffers in the intervening spaces.*

One of the most interesting constructive features of the Basilica is the two winding brick stairways, built in the outer walls which are 5 meters or nearly 20 feet thick. They are beautifully constructed in cylindrical wells seven feet in diameter, faced with brick of a fine vermilion tone, which are more carefully laid than in other parts of the structure, as they were not to be covered with marble or stucco. The central shaft, over two feet in diameter, is built of radial brick, and into it are mortised the ends of the treads of which there were originally 115 from the pavement of the Basilica to the terrace above (Fig. 16).

While the later brickwork of Constantine's time does not compare in fineness of material or workmanship with that of Hadrian's day, the stupendous mass and structural daring of this work make it worthy of notice.

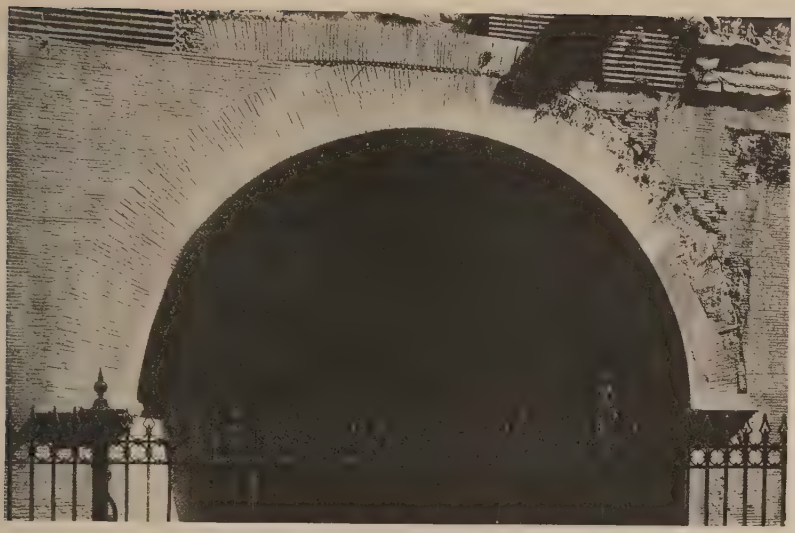


PLATE 10. A Great Arch at Base of Pantheon, Rome.

PLATE 11. Central Bay of North Aisle, Basilica of Constantine, Rome.

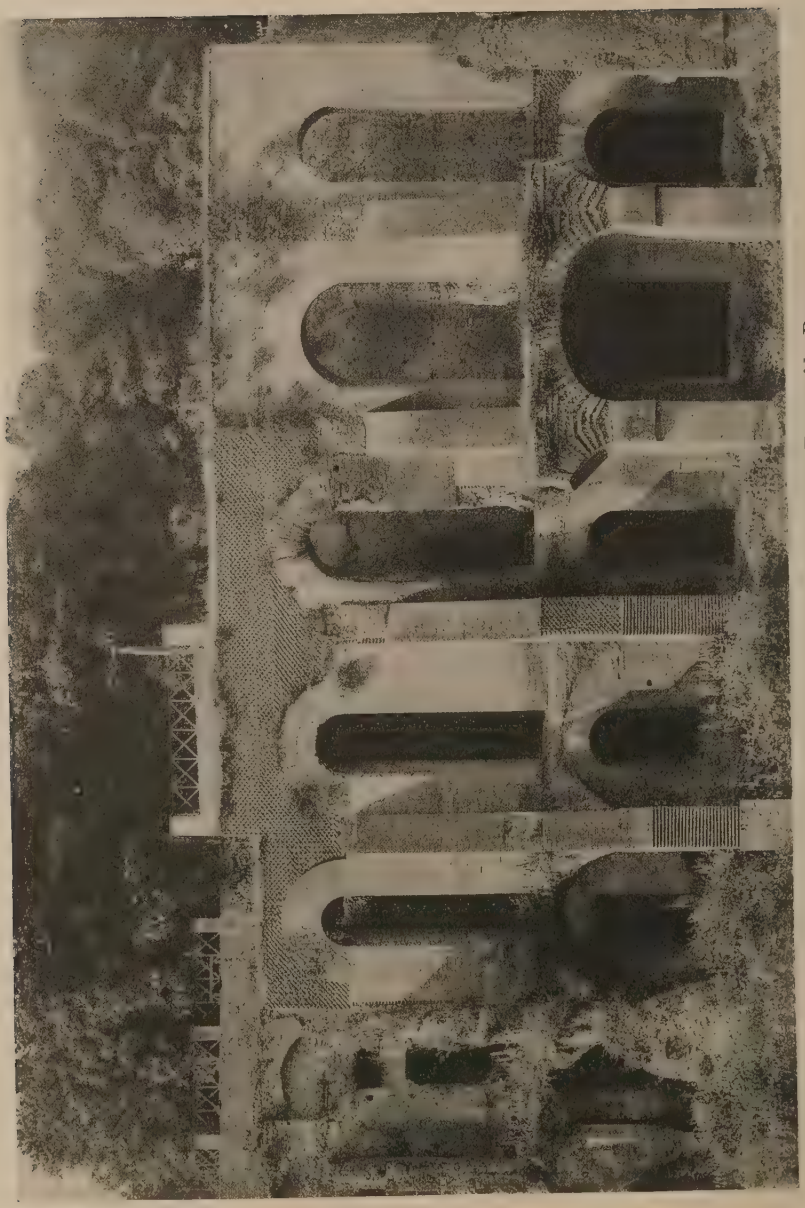


PLATE 12. Retaining Wall and Arches of Palatine, on Forum side, Rome.

PLATE 13. Brick Arches of the Via Nova, Foot of the Palatine, Rome, Looking West.

PLATE 14. Brick Arches of the Via Nova, Foot of the Palatine, Rome, Looking East.

seum. Later imposing examples are such as those in Hadrian's Villa near Tivoli, in the Baths of Caracalla, etc. Others of particular interest may be found in the houses at Ostia, which, though more modest, were sometimes built of a double layer of brick as if to afford greater assurance of their resistance to the heavy weight of concrete put upon them.

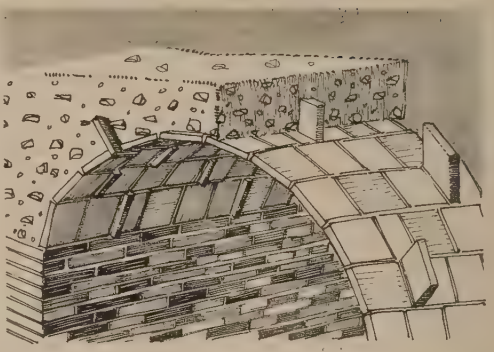


Fig. 14. Brick Centering for Arch

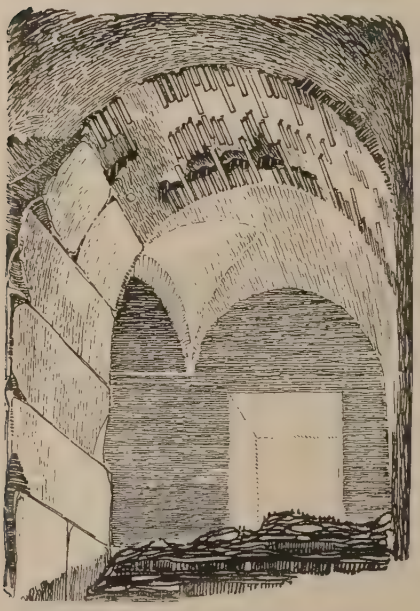


Fig. 15. Rudimentary Groining, Colosseum, Rome.

An expedient devised to lighten the concrete mass of the vault and consequently to diminish the weight upon the piers was the insertion of terra cotta *amphorae* or wine jars, especially in the groins, sometimes set irregularly, as in the Stabian Baths at Pompeii, in the *Villa dei Gordiani* at Rome, etc.; at other times with a more definite constructive method, as those at Pompeii,[1] and especially later in the constructions of the III and IV centuries. To be historically correct, however, we must remember that the first use of earthenware jars in the interior of wall masses, although following different principles, was made at Aosta in the Augustan age.[2]

Another improvement, in connection with the use of brick

1. Overbeck: *Pompei und seine Bauten.* 2. C. Promis: *Le antichità di Aosta.*

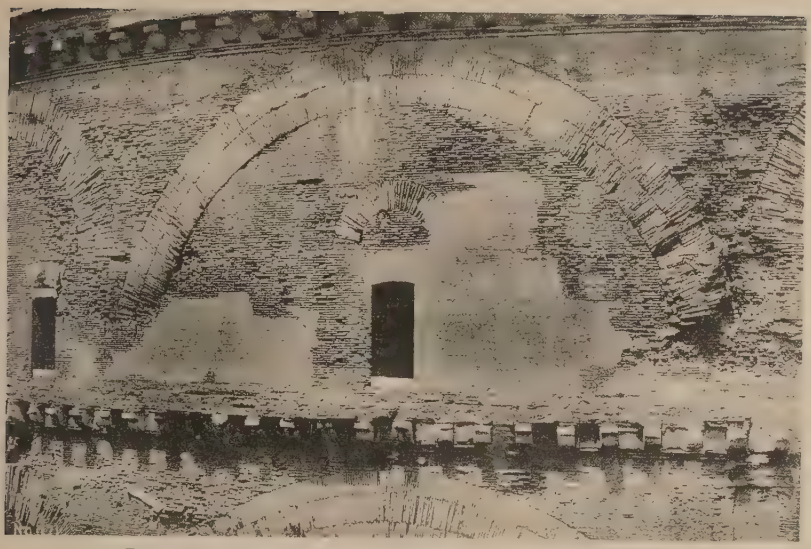


PLATE 15. Great Relieving Arches in Wall of Pantheon, Rome.

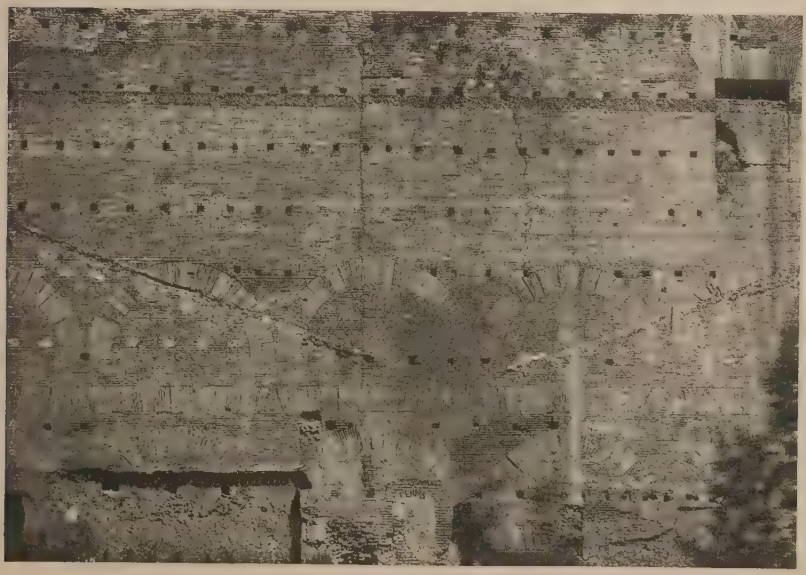


PLATE 16. Temple of the Divus Augustus, Western Side of the Palatine, Rome.

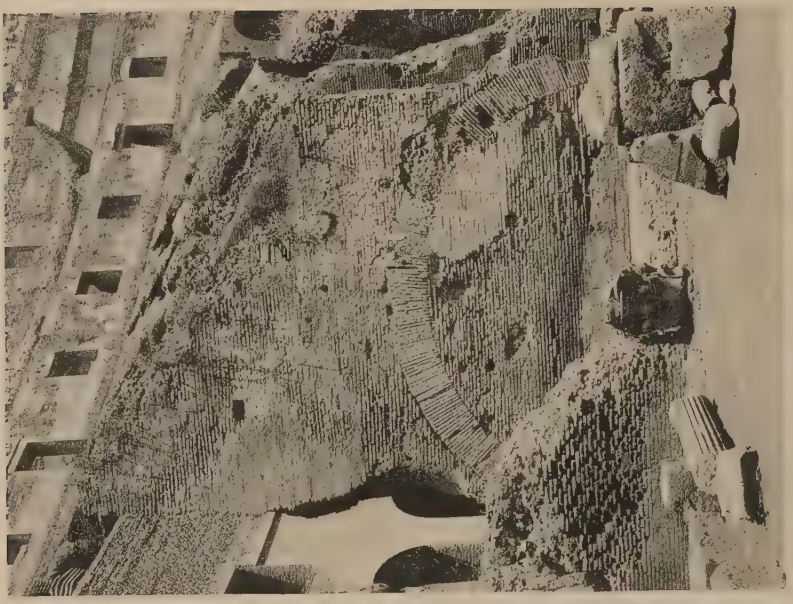


PLATE 18. A Relieving Arch, as seen in Colosseum, Rome.

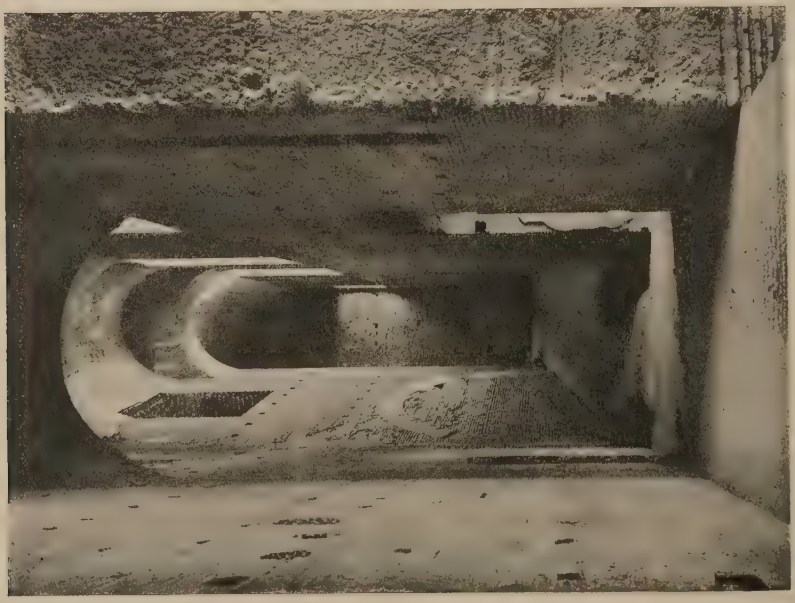


PLATE 17. Ramp from the Forum to the Palatine, Rome.

Plate 19

The Temple of Venus and Roma and the Campanile of Sancta Maria Nova, Rome

This splendid sanctuary was dedicated in the year 135 by the Emperor Hadrian to Venus, mother of the Julian Gens, and to the goddess Roma. Apollodorus, the famous architect of Trajan's Forum, the Pantheon, and the Villa near Tivoli is thought to have been its designer, although Hadrian himself, who was ambitious to be regarded as an architect, is said to have had a part in its design, as in that of other great buildings of his reign.

Near the Forum, this temple lies on the Velian Hill, a slight elevation between the Paletine and Esquiline, where seventy years before Nero raised a colossal statue to himself, as the Solar God, before the vestibule of his Golden House. This double temple covered an area of 458 by 328 feet with two apses set back to back. The one we see in the aquarelle is that dedicated to Venus and faces the Colosseum; the other faces the Forum. The walls of the cellae were of the usual brick faced caementum; but while the workmanship is excellent, it does not show the finish found in certain brick structures of the same period, as it was covered with marble, all of which has now disappeared leaving the brickwork exposed. At the left are glimpsed ruins of the Imperial palaces on the Palatine, while the tower in the background is that of the Senate on the Campidoglio or piazza of the Capitoline Hill.

In the middle distance is seen the campanile of Sancta Maria Nova, *one of the most graceful of the many similar* XII *century structures in Rome. It rises some 138 feet in five stories, divided by cornices typical of the period which consist simply of courses of brick with dentils, supported on marble brackets. The two lower stories have on each side two round arched windows, closed except for a narrow loophole. The three upper stories, visible in the aquarelle, are similarly treated with two round arched biform windows on each side, separated by a pier and connected with the other windows of the same story by a graceful dentilated brick course on a level with the imposts, running around the tower. Crosses and discs of rare stone and majolica embellish the field above and between the windows.*

The vivid color of the brick, which is a beautiful cinnabar red, the very excellent construction, and the harmonious though sturdy lines of the tower, pierced by its graceful windows, form a splendid decorative element in the famous panorama or that area which is comprised between the Campidoglio and the Colosseum and includes the Palatine and the Roman Forum.

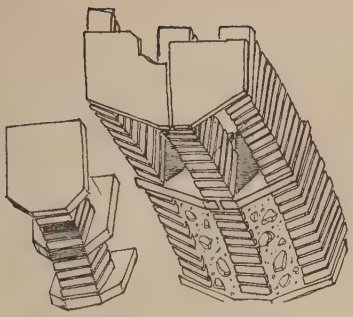


FIG. 17. Brick Groin at Crossings, as in Baths of Diocletian, after Durm.

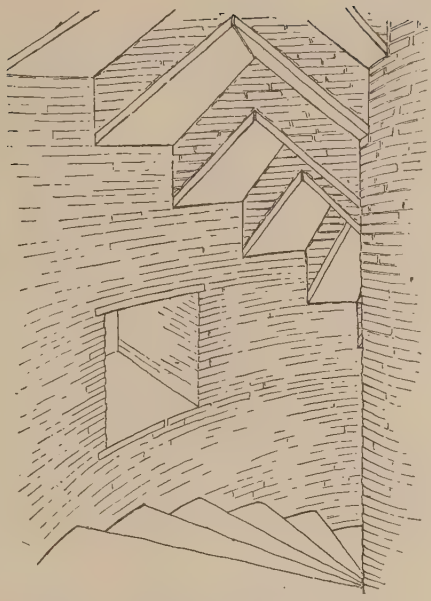


FIG. 16. Winding Brick Stair in Basilica of Constantine

in vaulting, introduced on constructive principles of a different nature, was that of subdividing vaults and cupolas into bearing arches of brick with intermediate fillings. The bearing skeleton was composed of brick ribs set along the transverse lines of the vault, along the diagonals of the crossing, or along the meridians of the cupola, thus directing the thrusts and concentrating them at the more resistant points of the piers.

PLATE 20. A Ribbed Crossing, Villa Sette Bassi, Via Latina, after Rivoira.

The disposition of these ribs in vaults was extremely varied and improved gradually with the progress of the static concept in construction. From simple brick semi-circles in barrel vaults and from rudimentary

groinings, of which one of the first examples is found in the Colosseum[1] (Fig. 15), we see the gradual development of this principle in the diagonal ribs of intersecting vaults with ingenious disposition of the bricks as, for example, in the Arch of Janus Quadrifrons, in the palace of Septimius Severus on the Palatine, in the Baths of Diocletian (Fig. 17), etc.[2] At times these ribs project, as in *Villa dei Sette Bassi* (Plate 20),[3] as if to anticipate the classical type of crossings in Lombard architecture, until they develop into the ribs of cupolas as in the Sepulchre of the Calventii, in the Temple of Portunno at Porto,[4] etc. These groinings, in which we may perhaps see the germ of that conception which found full development and perfect application in the marvelous cupolas of our Renaissance and successive epochs, had their stylistic expression in the coffering or paneling at the time when the cupola was introduced (Fig. 18). At times these ribs do not mark the meridians of the cupola but are interlaced

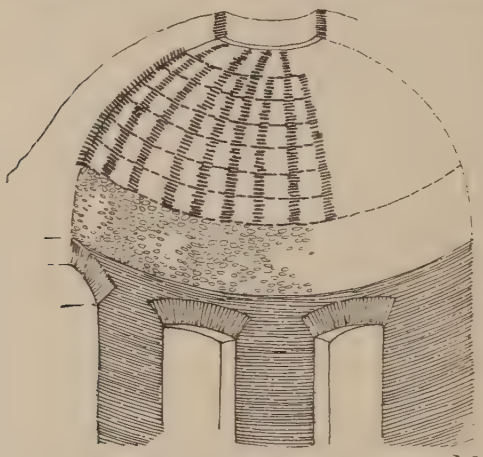


FIG. 18. Brick Ribs in Dome of Sibylline Temple, Tivoli.

FIG. 19. Herringbone Paving with Small Brick, Roman Forum.

1. RIVOIRA: op. cit. 2. GIOVANNONI: op. cit. 3. NIBBY: *Analisi della carta dei dintorni di Roma*, III, pp. 734-737. LANCIANI: *Quatre dessins inedits de la collection Destailleur relatifs aux ruins de Rome.* ASHBY: *The Villa Called Sette Bassi.* 4. MONTANO: *Disegni di vari tempietti ricavati dall' antico.*

as in the apse of the Temple of Venus and Roma at Rome (Plate 19) and as appears from some drawings of Renaissance artists.[1]

Finally, we may note among many others, two particular uses of brick. Pavements which were generally made either of large flat tiles or of very small bricks set on edge in herringbone fashion (Fig. 19), and the wall surfaces of baths (*laconicum* and *calidarium*) were constructed of one-celled hollow bricks, generally 8 x 13 x 33 cm. [2.2 x 5 x 13 in.] in size, which afforded passage for the circulation of smoke and hot air (Fig. 20). This ingenious and widespread system of heating which is found at Pompeii was first extensively applied in Hadrian's Villa near Tivoli and later in the Baths of Caracalla and of Diocletian at Rome.

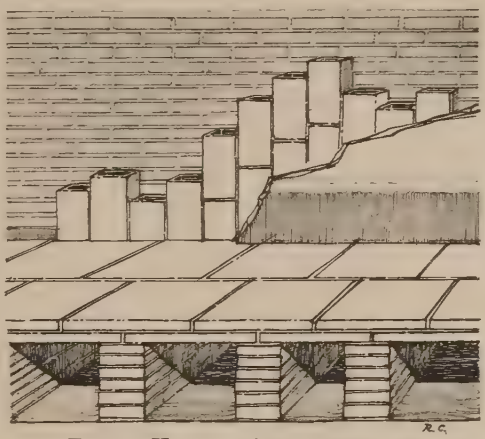


Fig. 20. Hypocaust in Pompeiian Bath.

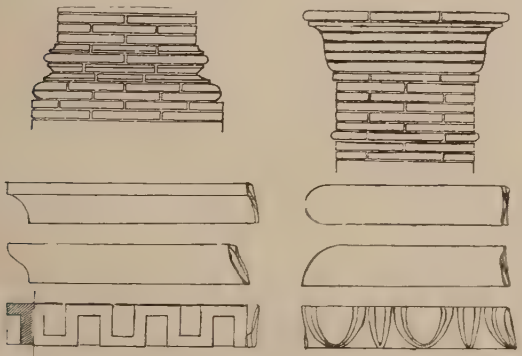


Fig. 21. Moulded and Cut Brick, as at Ostia.

Brick in Decoration

As already indicated, brick was used generally from the most ancient times, not only in construction but also for exterior decoration, especially in buildings of the modest arch-

1. *Il libro di Giuliano da Sangallo*, Codice Barberiniano, Vat. Lat. No. 4424. *Disegni della Galleria degli Uffizi*, No. 1330.

itectural type where the real life of the common people and of the middle classes was unfolded in all its manifestations. Unfortunately, there exist only rare and inadequate remains of these buildings which, just because they lacked public or monumental character, were not only more or less neglected but suffered greatly during frequent periods of reconstruction, as well as from the trying vicissitudes of the centuries, and hence more readily disappeared in the course of time.

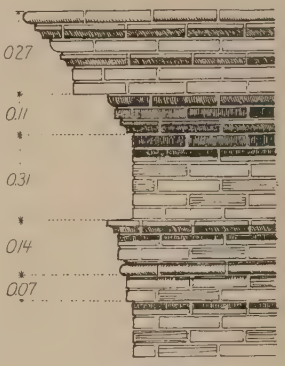


Fig. 22. Brick Entablature, as at Ostia.

However, the remains of widely scattered tombs in the environs of Rome, the edifices brought to light at Pompeii and preserved (at least in their essential parts) through the terrible caprices of nature, and still more the excavations at Ostia, prove to us that brick and terra cotta were widely used for purposes of decoration. In fact, along with the monumental architecture of imposing temples and sumptuous public edifices, covered with rich decorations in stone and marble, we see developed a real architecture in brick and terra cotta. In houses, shops, taverns, and sepulchral edifices, brick was used for wall surfaces artistically done, for simple and refined cornices, for panels, and the like. And often with special bricks (Fig. 21), cut in ovoli, dentils, palm-leaves, scales, etc., cleverly adapted, there were formed brackets, elaborate cornices, Ionic, Corinthian, and Composite capitals (Figs. 22, 23), and in general all the

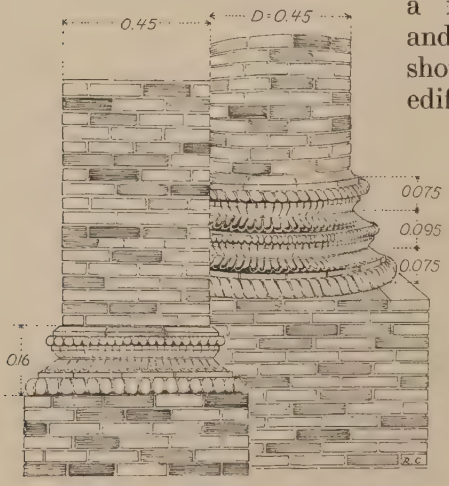


Fig. 23. Bases of Brick Columns, as at Ostia.

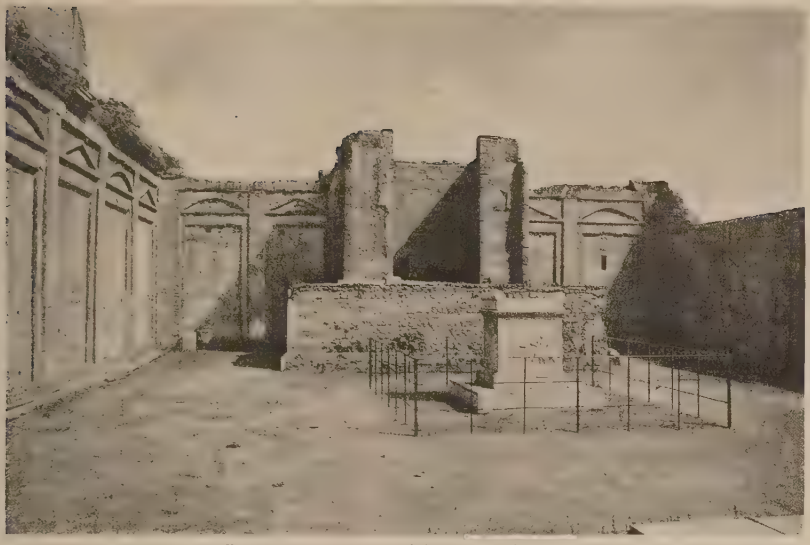


PLATE 21. Temple of Augustus, Pompeii.

motives and varied compositions of classical architecture which showed that the use of brick held no secret for those accomplished builders of ancient Rome.

Sometimes, alongside of this richer decoration, we see walls adorned with simple panelings, cornices, etc., which give them a very pleasing relief and a harmonious aspect (Plate 21). Often the effect of polychromy was cleverly exploited chiefly by the use of yellow, red, and brown bricks, which were at times intermingled without any definite aim, as in the *Anfiteatro Castrense* (Plate 25). More frequently, however, by following an exact decorative method, the color scheme was attained by building the projections of the wall, generally the architectural orders, of light-colored bricks and the background of darker ones or vice versa. Often the frieze stood out, because of the yellow color of its bricks, in contrast with the reddish browns of the architrave and cornice. Quite frequent also was the use of decorative terra cotta, moulded with rare skill and exquisite artistic sense, which gave a peculiar beauty and vivacity to the entire architectural organism.

Speaking generally, and judging from the remains, it may

be said that the use of burned brick began to spread rapidly toward the close of the Republic. At that time, and generally throughout the period of the first emperors, brickwork was characterized by regularity and great care in execution; the mortar joints were very thin, so thin that, especially on the face of the wall, they did not exceed two or three millimeters in thickness [1/12 or 1/9 in.]; the bricks were of excellent clay and manufacture, well burned, and very hard.

In the II and III centuries, there began at first to appear various defects in the brickwork which later became gradually more marked. The mortar joints increased in thickness so as to exceed more than three or four centimeters [1.2 or 1.6 in.]; the courses were less regular and in the end came to be laid with bricks of all dimensions. Not infrequently, there were used, during the last years of the Empire, bricks taken from ruins, and construction in general betrayed a very careless execution. The bricks to begin with were of a lower grade and coarser texture, made of poorly pugged clay, and the workmanship in laying showed signs of deterioration.

Decoration followed the general course of Roman art. Sober, elegant, and of the purest lines in the last days of the Republic and the first years of the Empire, it became richer and richer and invaded every exposed surface on the wall up to the point of becoming exuberant, though it preserved great correctness of form. Later, with the decline of art, we find it becoming commonplace, poor, misshapen, and showing clearly in what a short period of time that art declined which has left to the world so many wonderful monuments.

Leading Examples

Far indeed from pretending to give a description of all Roman constructions in brick, for which a much more extensive treatment than the present would be necessary, we shall limit ourselves to mentioning a few of those best preserved or possessing special characteristics, and to giving as far as possible an idea of brick construction in which, as in all other fields, the spirit of Rome reveals its greatness.

One of the first and most distinguished monuments in brick we have to note is the *Porta Palatina* (Plate 22) at Turin

PLATE 22. Porta Palatina, Turin, Restored.

which perhaps may be ascribed to the age of Augustus[1]. It is flanked by two sixteen-sided towers of five stories each, between which on the ground level are four arches of sober and severe aspect, two major and two minor. Two orders of arcades, as in the *Porta Nigra* of Treves and the *Porta del Paradiso* at Susa, surmount the basement zone and give lightness and elegance to the whole structure. These arcades are framed by two architectural orders of the purest line and executed, like the entire edifice, with great care. They were not intended merely as decoration but were indeed necessary for the defense of the gate and could be reached safely from within the city wall.

Another notable example of face brick construction is found in the before mentioned *Castro Pretorio* at Rome, constructed by Sejanus, the terrible favorite of Tiberius (Plate 23). Although not possessing any special decorative interest, perhaps on account of their particular purpose, we must, however, note in these constructions of the Pretorian Guard, not only the beautiful reddish brown color of the carefully smoothed bricks, but also the gates flanked by battlemented towers and adorned with loopholes and cornices (Fig. 8).

Of this first period, we again recall the *Anfiteatro Castrense* (Plate 25), which is more interesting than the *Castro* from the standpoint of decoration, consisting as it does of an inferior order of arcades resting upon piers and framed by a Corinthian order of engaged columns and a superior arcuation, glimpsed at the left, in which pilasters are substituted for the columns. In this monument there are two things of especial interest: the substitution of square blocks of travertine for the usual bases of the columns, and the exquisite workmanship of the Corinthian capitals, executed wholly in brick, constituting one of the first examples of this sort.

Worthy of mention are the varied combinations which brick construction assumed in the *opus reticulatum* in the first century. An example of this is the tomb at Ostia (Plate 24), before alluded to, of the time of Claudius.[2] It is most carefully executed and very beautiful because of the geometric decora-

1. Rivoira: op. cit. pp. 62-75. 2. Paschetto: *Ostia, Colonia Romana, storia e monumenti*, pp. 441 ff. Vaglieri: *Notizie degli scavi di antichità, ecc.* 1912, p. 23.

PLATE 23. Detail of Wall of Pretorian Camp, Rome.

PLATE 24. Detail of Tomb, Time of Claudius, Ostia.

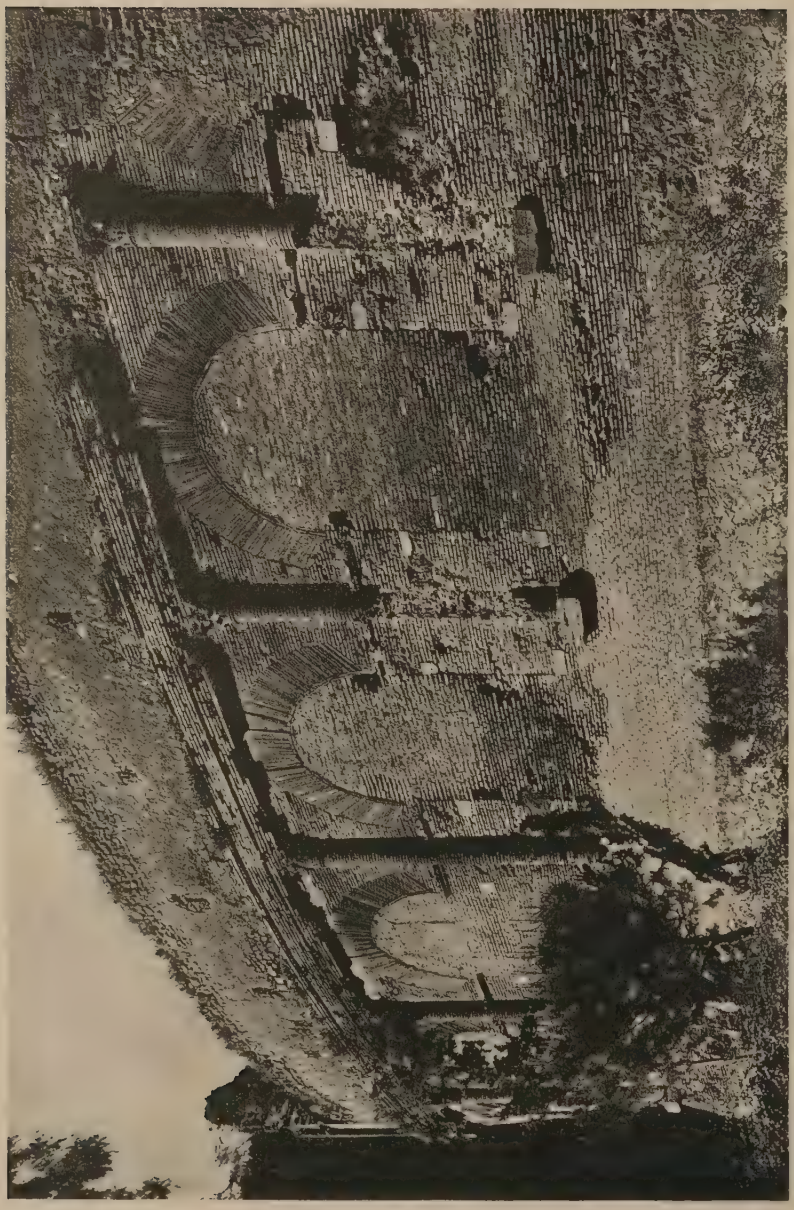


Plate 25. Castrensian Amphitheatre, Rome

tions, secured by a well chosen combination of tufo and brick. Well worthy of remark also are the bases of the pilasters, obtained by combining moulded bricks of which we shall see other varied applications later.

We may note incidentally a motive, both constructive and decorative, which appeared very early and became quite common in Roman architecture. It consisted of little arcades of brick supported by brackets of stone, or of brick vaults projecting from the external walls of buildings and serving to support the balconies. These balconies are found not only in the drawings of ancient monuments left by artists of the Renaissance (as the Nymphaeum in the Gardens of Sallust at Rome,[1] and the Temple of Portunno at Porto[2]) but also in the *Domus Gaiana* on the Palatine. These characteristics are also seen in a few houses at Ostia (Plates 26, 27) in the Via Della Fortuna,[3] and in the vicinity of the Temple of Vulcan[4], where perhaps they were embellished by terra cotta and vari-colored stucco. We present an interesting reconstruction of such houses[5] made by the distinguished architect Gismondi (Plate 28).

Continuing our examination, we find that brick was extensively used for decorative purposes in the group of edifices constituting the Forum of Trajan at Rome, especially in the so-called Baths of *Paolo Emilio* (Frontispiece). Here it was that the celebrated Apollodorus, Hadrian's Graeco-Syrian architect, displayed his eminently artistic qualities and exquisite sense of architectural refinement. These decorations followed motives similar to those which are found also in the entrance to the Baths at Ostia, in the office of the Grain Market[6] and in the *Horrea Epagathiana*, also at Ostia (Plate 29). These decorations, consisting of tympanum, cornice, pillars or half columns, capitals and bases, all executed wholly in brick, became very frequent in Roman architecture. Other important buildings of the kind might also be mentioned, such as the structure surmounting the *Praetorium* of Hadrian's Villa near Tivoli, which is decorated with elegant pilasters; the external portico of the

1. *Biblioteca Vaticana*, Codice Vat. Lat., No. 3439, folio 30. 2. *Il libro di Guiliano da Sangallo*, Codice Barberiniano, Vat. Lat. No. 4424. 3. Paschetto: op. cit. p. 316. Carcopino: *Melange d'archeologie* XXX, p. 417. 4. *Notizie degli scavi, ecc.* Series V., Vol. 12, p. 324 ff. 5. *Rivista di Architettura e d'arti decorative*, Rome, 1923. 6. Paschetto: op. cit. p. 314. Carcopino: op. cit. p. 424.

theatre at Ostia, of which there are the very beautiful remains of an elaborate entablature in brick; and the like.

But we ought rather to turn our attention to certain edifices of a more modest architectural type which have come down to us less damaged than those thus far considered, inasmuch as few things can give us so lofty a conception of ancient art as these buildings. We should think of them not as the work of great artists, but rather of modest, though very skillful artisans and that the material employed did not lend itself to decorative refinement. However, the grace and at times the reserve in composition and form, effects here obtained by the use of very simple means, ought to fill us with admiration, and readily afford an idea of what the architecture of our ancestors was like. These buildings, for the most part sepulchral, either because of their number, traditional regularity in form, construction, detail, and prevalence through several centuries, or because of the different localities in which they are found, lead us to consider how widely diffused and applied brick architecture must have been in such well-defined types of buildings.

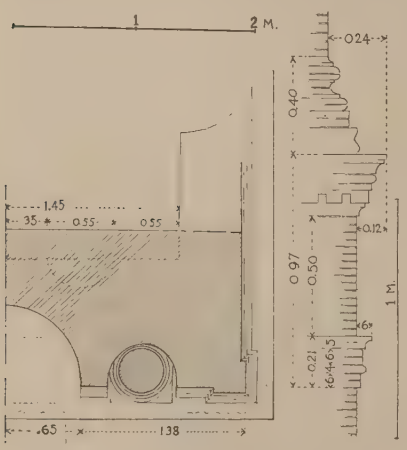


Fig. 24. Plan and Detail, Tomb of Persius.

One of the first in chronological order is the so-called Sepulchre of the poet Persius (Plates 1 and 30, Fig. 24), recently restored,[1] situated on the ancient Appian Way, a few kilometers from Rome. This monument is attributed perhaps with more reason to Quintius Verannius, frequently mentioned by Tacitus, who died in Britain in 62 A. D. where Nero had sent him as imperial legate;[2] or perhaps, as claimed by Canina,[3] to another person of the same name but of later date. This sepulchre presents a beautiful façade decorated above and

1. *Relazione dei lavori eseg. dall' Uff. Reg. dei Monumenti*, 1899 and 1902. Ashby: op. cit. 2. Nibby: op. cit. Vol. 3. pp. 553-4. 3. Canina: *Architettura Romana* p. 182.

PLATE 26. Houses with Arcaded Balconies, Ostia.

PLATE 27. Houses with Projecting Arched Cornices, Ostia.

PLATE 28. Reconstruction of Houses at Ostia by Gismondi.

PLATE 29. Decorated Portal in Brick, Ostia.

in the center by a large niche in which there certainly stood a statue. Flanking the niche are two brick columns set into the wall which give to the façade a pleasing sense of rhythm and a decided effect of light and shade. At the back, through a door with stone jambs, one has access to the sepulchral chamber which is as high as the whole edifice and decorated with niches.

Another edifice of the kind is the so-called *Torraccio della Cecchina* (Fig. 25) on the Via Nomentana, belonging to the second half of the I century. Of very noble aspect, it still preserves the traces of an entablature, an elaborate festoon, two small tabernacles above, and a space intended for the title of the departed.[1] This is one of the most beautiful ruins of the Roman Campagna.

FIG. 25. Torraccio della Cecchina, near Rome.

On the Via Latina, not far from Rome, we also find three interesting edifices entirely of burned brick belonging to the I and II centuries. Two of these are doubtless columbaria, rather than individual tombs, and are built in the form of small temples. The first (Plate 31, Figs. 26-28) shows two superimposed orders, Corinthian and Composite, with an elaborate entablature in the lower story. The facing is of a beautiful reddish brown brick, the pilasters and cornices of yellow brick.* The bricks

*These brick are very perfectly made, with clean straight arrises, and laid in an exceedingly thin joint. On the face they measure 2.5 x 26.5 cm. (.98 x 10.43 in.) [*Ed.*]

1. TOMASSETTI: *La Campagna Romana. Archivio dell Società Romana di Storia Patria*, Vol. 12, p. 51.

PLATE 30. Tomb of the Poet Persius, Appian Way, Rome.

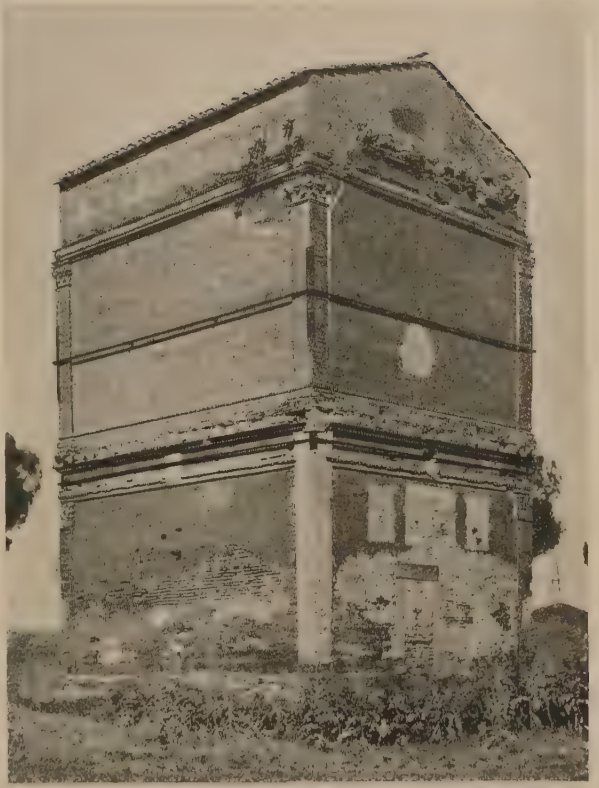


PLATE 31. A Columbarium on the Latin Way, Rome.

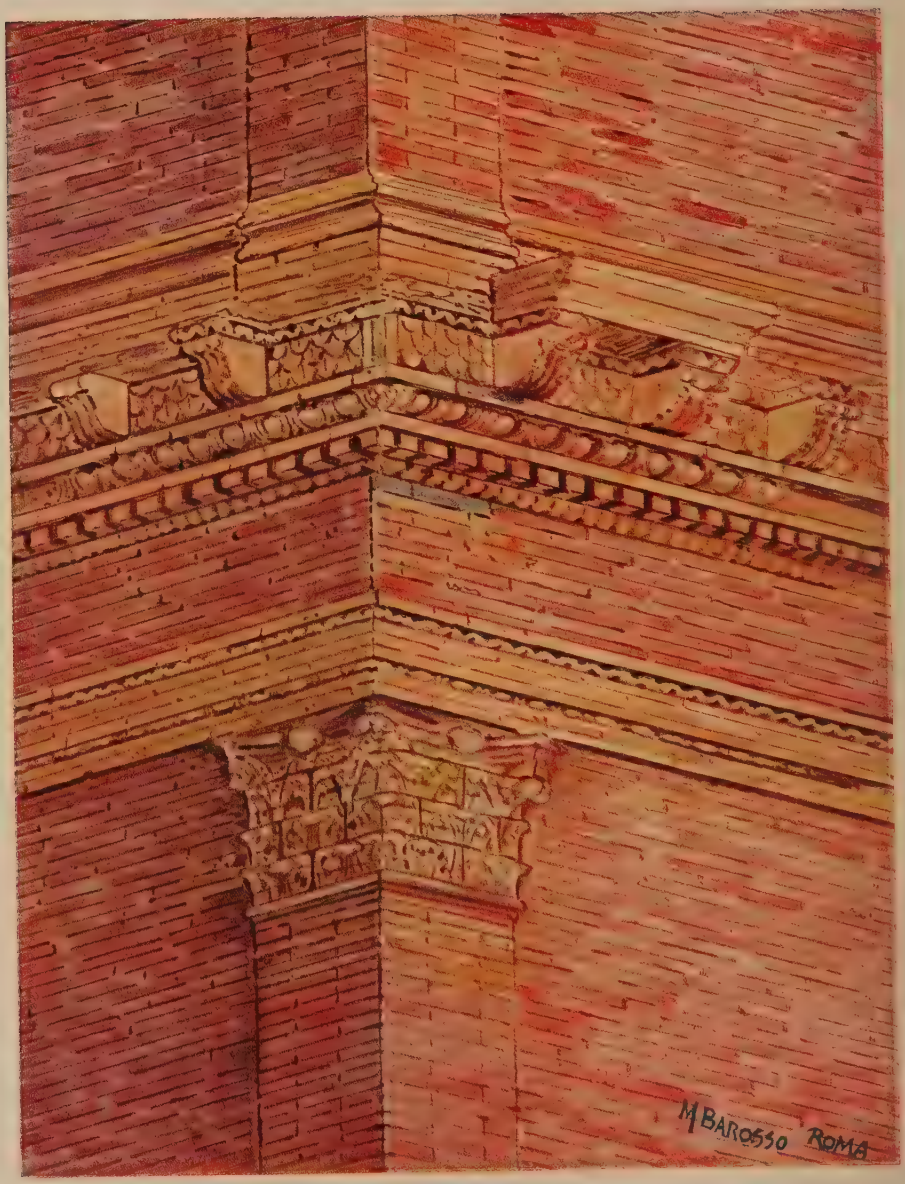

M BAROSSO ROMA

Plate 32

Detail of Columbarium, the Latin Way, near Rome

The ancient Romans commemorated their dead by interring them along the great public ways, outside the city, and building to them monuments as their taste dictated or their means allowed. The remains of such tombs along the great roads leading out of Rome well repay a visit, not only because of their historic interest but also because of their construction and artistic merits.

These tombs, however, were not always the exclusive memorial of a distinguished individual or family, but were erected by a sodality, a collegium, or a guild which, among other mutual benefits, provided for the fitting burial of its members. The society would erect a Columbarium provided with many niches on the interior for the reception of cinerary urns. It might be that such a structure was a commercial enterprise organized for the burial of the dead.

The aquarelle shows a detail of the columbarium, seen in Plate 31, built on the Via Latina, *a half hour's ride outside the* Porta San Giovanni. *The entablature of the first story is shown, together with parts of the corner pilasters above and below. The brick is of a beautiful clear red and laid with the utmost skill. The Corinthian capital is carved out of brick, set in three-course blocks, in the manner of the best stone work.*

The architrave is made up of slightly projecting brick courses enlivened by two simple fillets. The frieze is unadorned, but the cornice makes an elaborate use of dentils, ovoli, brackets, and other embellishments. The brackets are especially interesting, each bracket consisting of three bricks set on edge and carved to form. Between the brackets are buff terra cotta scale plates. While many of the finer projecting parts have been broken off, the whole monument reveals to what perfection, as an art, fine bricklaying was carried in the early Imperial days of Rome.

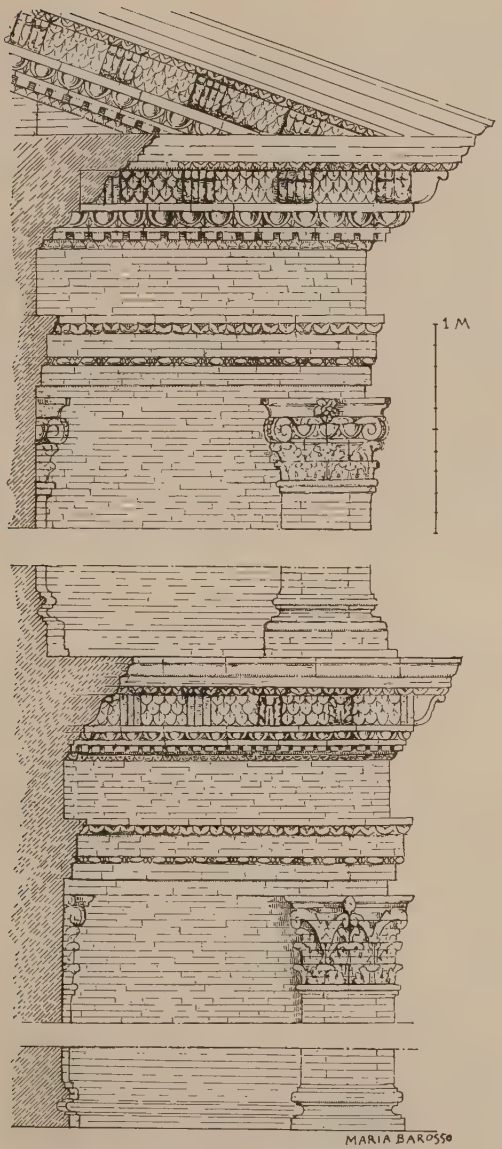


FIG. 26. Detail of Tomb in Plates 31, 32.

PLATE 33. Detail of a Columbarium on the Latin Way, near Rome.

PLATE 34. Tomb of the Valerii on the Latin Way, near Rome.

of the cornices are elaborately carved in the form of dentils, ovoli, beaded mouldings, scales, etc. (Plate 32, Fig. 26). The acanthus leaves of the capitals are of exquisite workmanship, and on the facade there remain unquestionable fragments of the ornamental terra cotta with which it was adorned. The second, of which we present simply a detail (Plate 33) is of one story only. Like the first, the wall is of a beautiful reddish brown brick very carefully laid, while the Corinthian order is of yellow brick. The dentils, the brackets, formed by three bricks set on edge, and the other mouldings, cut perhaps before the bricks were burned, are of interest. (See Figs. 25-27).

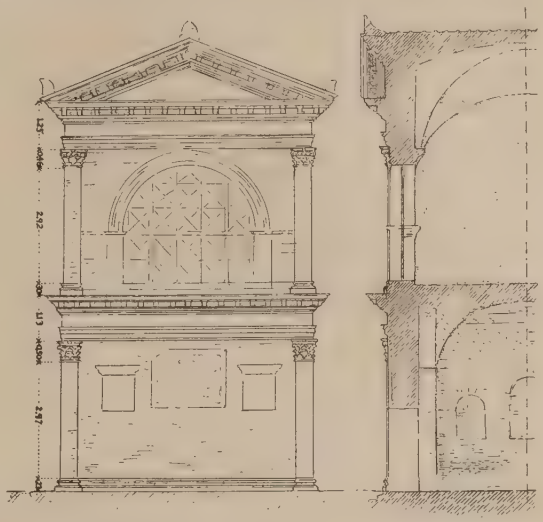


Fig. 27. Elevation and Section, Tomb on Latin Way.

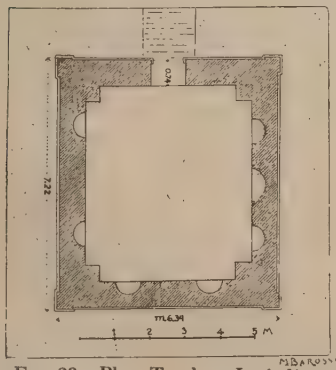


Fig. 28. Plan, Tomb on Latin Way.

The sepulchre[1] attributed to the Valerii (Plate 34) situated near by is much more imposing and beautiful, though more sober in its decoration. From the atrium of which there remains only a short stretch of wall decorated with engaged Corinthian columns, fully restored, one descends to the subterranean chamber by means of two lateral stairways, while the platform between leads to the main chamber on the ground level (Fig. 29). This tomb, which remains

1. Fortunati: *Relazione degli scavi eseg. nella Via Latina*, 1859. *Bollettino di correspondenza archeologica*, 1857. p. 177. 1858 pp. 18 & 81.

today almost intact, although with some restorations, is very beautiful in its simplicity. Unlike the other examples which we have examined, some of its cornices are not made of the usual moulded bricks but of small blocks of terra cotta. Although these tombs show the marks of age and the trying vicissitudes of time, their actual state of preservation, in spite of the devastations of storm and earthquake and war during eighteen centuries, speak well for the enduring character of the material employed and the thoroughly competent workmanship with which they were erected.

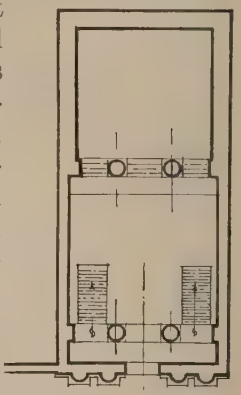


Fig. 29. Valerii Tomb.

In other parts of Italy and belonging to this same period may be mentioned two examples: the so-called sepulchre of the *Conocchia* near Capua (Plate 35), remarkable for its fantastic architectural composition, analogous to a thoroughly baroque conception of later times; and the ill-preserved remains of an arch and a

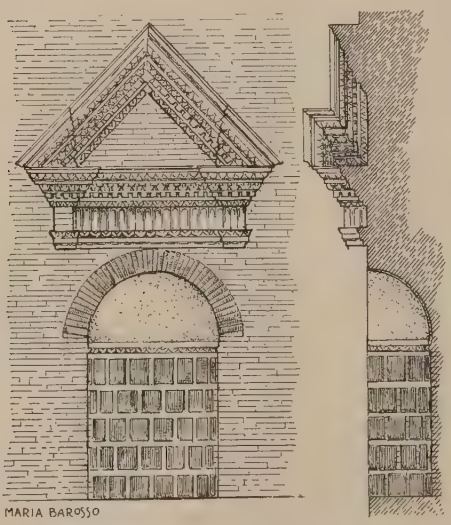


Fig. 30. Detail, Tomb of Annia Regilla.

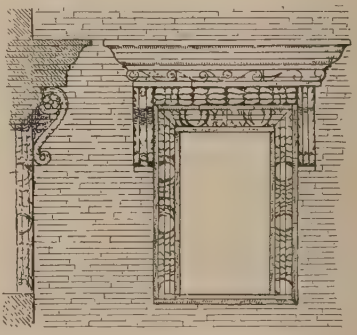


Fig. 31. Detail, Tomb of Annia Regilla

tomb near Canosa in Apulia, which in workmanship is very similar to the preceding (Plate 36). Proceeding in almost chronological order, we find other important sepulchral edifices in brick quite well preserved. One, the so-called *Triopio* of Herodes Atti-

ROMA·
TOMBA DI ANNIA
REGILLA· ·DETTO
TEMPIO DEL
DIO REDICOLO·
METRI
1
50
MARIA BAROSSO
ROMA.
1.38
2.00
1.95

Plate 38

Detail, Tomb of Annia Regilla, near Rome

At the third mile stone on the Appian Way, a little beyond the church of Domine Quo Vadis, *one turns to the left to find the tomb of Annia Regilla, situated in the ancient Vale of Egeria, known as the Valley of Caffarella after the ducal family that formerly owned it, lying between the Appian and Latin Ways on the Roman Campagna.*

This structure frequently bears the name of the Deus Rediculus (*Tempio del Dio Redicolo*), *as it was thought by some to have been a temple erected to the "god who inspires retreat," at the time when Hannibal, alarmed at the depredations of Scipio in Carthaginia, withdrew from Italy and hastened home (203 B.C.). The more likely account is that the immensely wealthy Tiberius Claudius Herodes Atticus, builder of the Odeon on the slopes of the Acropolis at Athens (cir. 161) who possessed a sumptuous villa in the vicinity of the grotto of Egeria, nymph of the place, had erected here this beautiful temple-like tomb to commemorate, as he had also done in building the Odeon, his wife Annia Regilla.*

As this occurred in the days of the Antonines, when the fine brickwork of Hadrian's time still had its influence, the brick facing of the tomb represents the very best kind of material and workmanship. The fine red and yellowish tones of the brick have been used in columns, pilasters, and entablatures to produce very artistic polychrome effects; and, when required, the brick have been cut, chiseled, or rubbed into a variety of ornamental forms.

The tomb has on the interior two stories with groined vaulting, but shows only one order on the outside. It is nearly square with sides approximately 29 feet, and rises to an estimated height of 36 feet upon a six and a half foot basement. In spite of the vicissitudes of eighteen centuries, it still reveals the excellence of its original workmanship, suggested in part by the colored details here shown.

PLATE 35. Tomb of the Conocchia, near Capua, after Peranesi.

PLATE 36. Remains of Tomb near Canosa, Apulia.

PLATE 37. Tomb of Annia Regilla, near Rome.

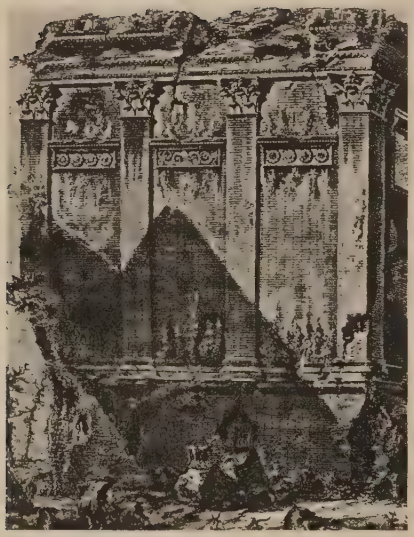


PLATE 39. The Temple of Health, Appian Way, near Rome, after Peranesi.

PLATE 40. Church of Sant' Urbano, once a Temple of Bacchus, near Rome.

cus,* which perhaps contained the body of Annia Regilla,[1] his wife, was built during the latter half of the II century in the usual form of a chapel (Plate 37). In addition to the excellent brickwork, it combines with a refinement of composition an elaborate decoration in brick where the color scheme, intelligently applied, was not neglected. It is composed of a basement zone and an upper Corinthian order. The motive of octagonal columns set into the thickness of the wall is a very attractive feature (Plate 38) and reminds us of the tomb of Quintius Verannius already examined (See Figs. 30-32).

We give two further examples of a similar type, namely, the so-called *Tempio della Salute* (Plate 39), shown by the engraving of Piranesi in a better state of preservation than it is today, and the Church of *Sant' Urbano*, believed formerly to have been a Temple of Bacchus (Plate 40). In both these structures, the formal decorations in gables and cornices are carried to the point of exuberance.

*The word "triopio" is perhaps derived from the triangular form of the land on which the tomb was erected. [*Ed.*]

1. CAETANI : *Il Triopio e la Villa di Erode Attico, Nuova Antologia*, 1896. TOMASSETTI: op. cit. Vol. 2.

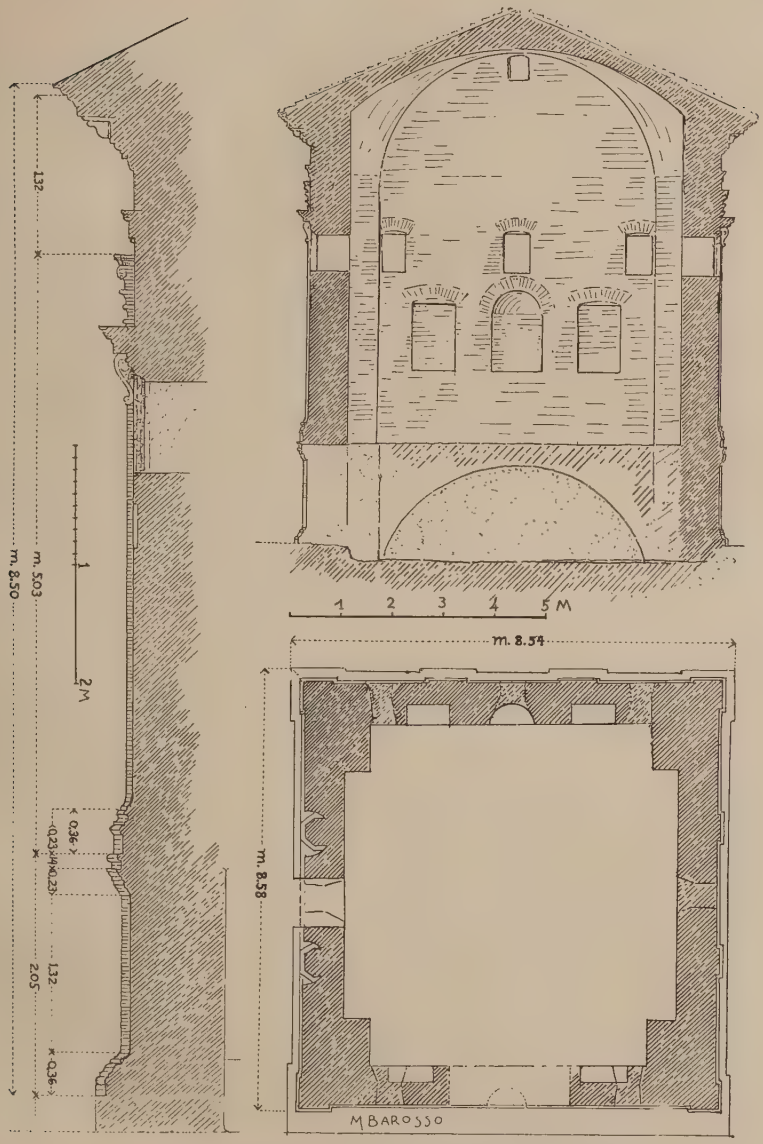


FIG. 32. Profile, Section, and Plan, Tomb of Annia Regilla.

PLATE 42. The Pincian Gate, Rome.

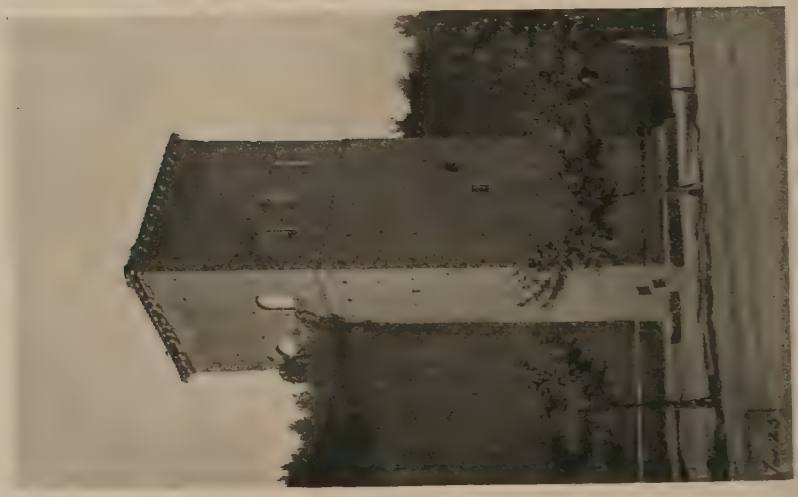


PLATE 41. Tower in Aurelian Wall, Rome.

PLATE 43. The Porta Asinaria in the Aurelian Wall, Rome.

Because of the nature and brevity of the present treatise we do not deem it fitting to cite here other edifices of brick construction, since, especially in the III and IV centuries, they present no particular merit. Art, and consequently brick architecture, followed the rapid decline of the Roman Empire. The Station House of the VII Cohort of the Watch, in the Trastevere indicates to what point has fallen the art of brickwork which once had attained in Rome so distinguished a height.[1] We mention only as a last and imposing construction with brick facing the Aurelian Walls of Rome,* noted for their towers and galleries for the patrol (Plates 41-43).

PROF. ING. CARLO ROCCATELLI

*These walls are built of the usual *caementum* core faced with brick. Although battered down and rebuilt in various sections during the centuries, so that they represent all dates from the time of Aurelian (270-275) on, they are, as we see them today, substantially the walls as built by that Emperor in the III century. Originally, they were twelve miles long, but only eight miles, or the portion on the left bank of the Tiber, remain. Very little of this mighty work is to be seen on the Vatican side. As the wall is about 12 feet thick, its parapetted top, 60 feet above the outside ground level, afforded a broad walk for the garrison, and allowed for an interior passage, 10 feet above the inside ground level, for the guard. This passage opened out toward the city in frequent high arched openings. There were some 300 great square towers projecting from the wall, and spaced every forty-five or fifty feet. While these towers are assigned to the days of Honorius (395-423) the imposing round towers of the *Porta Asinaria*, near St. John's Lateran, are said to belong to Aurelian's time. In building the wall, Aurelian took advantage of existing structures in the line of circumvalation, such as great villas, aqueduct arches, the Pretorian Camp, the Castrensian Amphitheatre, the Pyramid of Cestius, and the like by making them integral parts of the fortifications.—[*Ed.*]

1. G. B. DE ROSSI: *Annali dell' Istit. di corrispond. archeolog.*, 1858, pp. 278 ff.

BRICK IN THE MIDDLE AGES

Manufacture of Brick

The entire Medieval period affords no bibliographical sources from which to draw definite information on the manufacture of brick, but we may assume that the methods were doubtless much the same as in the preceding period and would differ little from that employed today for hand made brick. In dimensions, there was seldom found standardized brick in which length and breadth were approximately multiples of thickness. On the contrary, there was much variation due both to tradition and to the localization in manufacturing and building practice to which Professor Giovannoni in his Preface has alluded.* Thus at Ravenna, some of the old brick found in *San Giovanni Evangelista* and in the Tomb of *Galla Placidia* are 8.5, 9, and even 10 cm. in thickness [3.4, 3.5, 3.9 in.] while in *San Vitale* they do not run over 4.5 cm. [1.8 in.]. Later in the period, the usual thickness of the Roman brick, 3-4 cm. [1.2-1.6 in.], is found; at Bologna, in the XVII and XVIII centuries, the brick are from 5 to 7 cm. thick [1.9-2.8 in.].

We no longer find the wedge-shaped brick which had already disappeared in the last period of Roman civilization and which was so prized in the construction of arches. We do find, however, bricks with one face in the form of an arc for use in columns, as seen very frequently at Bologna. There were also bricks curved flatwise to serve on the extrados of arches. These were employed a little everywhere after the X century.

Roofing tiles, both curved and flat, were also manufactured as in the Roman period, but of much smaller dimensions, ap-

*In length and breadth the dimensions ran all the way from 27-51 x 12-34, cm. the breadth not always being one half the length, as the making of regular bond patterns by the use of headers and stretchers, as known to us, was not generally practiced. In the main the prevailing dimensions were 3.5-4.5 x 30-32 x 15-16 cm. (1.4-1.8 x 11.8-12.6 x 5.9-6.3 in.); although, as Professor Porter points out, much larger brick are frequently found, as at Vigolo Marchese, Stradella, Milan, and Montechiarugolo, in the first half of the XI century and occasionally in the XII century. Brick now being used in restorations at Chiaravalle, Milanese, measure 9 x 55 x 27 cm. (3.5 x 21.7 x 10.6 in). To account for the great variety of sizes and shapes used during this period, Porter regards it to have been a common practice throughout the Romanesque times to cut and not mould the green clay into the desired forms before drying and burning. He also calls attention to a practice originating in the XI century of cross hatching the brick, to aid bonding, either when green or after being burned and laid in the wall, a practice which continued to the close of the XII century and then disappeared (*Lombard Architecture*, Vol. I, pp. 36, 38). Where later restorations have removed the gesso covering, the scoring on these brick presents a not unpleasing texture effect. [*Ed.*]

proaching an average of 30x45 cm. [11.8x17.7 in.] and often even smaller. At a later period the flat tile disappeared almost entirely, as may be seen in the roofs of nearly all the constructions from the XII century on.

Brick in Construction

The use of brick extended to religious and municipal buildings, and to monumental work of various kinds. There were no longer great numbers of laborers for concrete work, or great financial resources to lavish on the splendors of stone. We have, instead, above all in the first period of the Middle Ages, works constructed almost entirely of brick: brick walls, brick pavements, and brick vaults. Economy was necessary; imposing thermal edifices and huge basilicas were out of the question after the fall of the Empire. There was no longer a powerful state which could exploit the labor of slaves, skillful both in construction and decoration. Hence, economy was sought both in the use of the raw material and in the employment of labor. The mason, however, will become more skillful, while the architect will have at his disposal very modest means for the work to be accomplished, and will attain a lightness of construction hitherto unknown, as we shall see in the examples to be examined which have remained intact in spite of the succession of various states of culture in the same regions.

We shall find vaults covering limited spaces with clever solutions hitherto unknown, because not required of the Roman architect. We shall see cornices, at first and for a long time afterward, as artificial arrangements of brick; then to evolve slowly into a very pure feeling which will become the constant characteristic of brick construction.

The Ravenna Period

Both in the V century when Honorius, the first Emperor of the West after the final division of the Empire, removed his residence from Rome to Ravenna (403), and in the following century when Justinian, Emperor of the East, having recovered Sicily and Italy, also chose that city as the seat of his Exarch (539), it was natural that the little city should rise to great importance and that, in the consequent building

activities, the Byzantine influence should be marked. It was during this disturbed epoch that there arose a new form of art which developed no longer at Rome as its center, but at Ravenna. Here we find famous architectural monuments which, by reason of certain elements, are connected with forms peculiar to the last Roman period, but with an altogether new feeling.

In construction, the simple brickwork of the exterior walls, with varying mortar joints, was no longer so carefully done, as if the artisans had hastened in order to devote themselves with the utmost zeal to interior decoration.

As a decorative motive in cornices, there prevailed a practice of setting the bricks corner to corner in saw-tooth fashion, often between regular courses. Wall surfaces were frequently embellished with blind arches and pilasters resting upon a base which ran around the entire edifice, but which today is for the most part sunk in the earth, chiefly because of the settlement to which the structures have been subjected. We mention a few of the more characteristic monuments in chronological order.

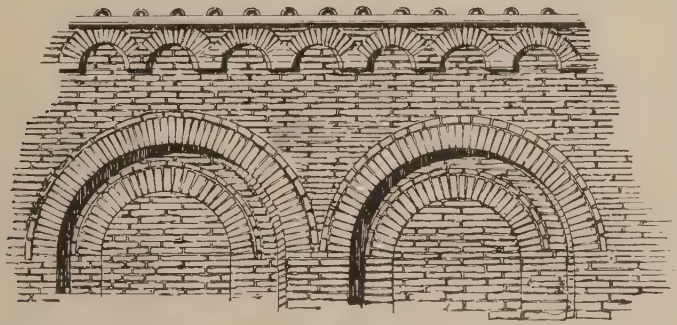


FIG. 33. Blind Arches in Nave Wall of San Giovanni Evangelista, Ravenna.

San Giovanni Evangelista, founded about the year 425 by Galla Placidia,* but entirely rebuilt later, has, in the external wall of the central nave, an order of small blind arcades supported by slender pilasters resting upon a light, continuous base. Above, a certain decorative effect was sought in a row of small

*Galla Placidia, sister of Honorius and daughter of the great Theodosius, an accomplished and beautiful princess, after a rather dramatic career with two royal husbands, became in 526 regent for her six-year-old son Valentinian III and virtually ruled the Western Empire for the next twenty-five years. [*Ed.*]

pendent arches (Fig. 33). We shall find these motives characteristic of brick architecture during this period, and later shall find them developed into various forms of expression throughout the Middle Ages.

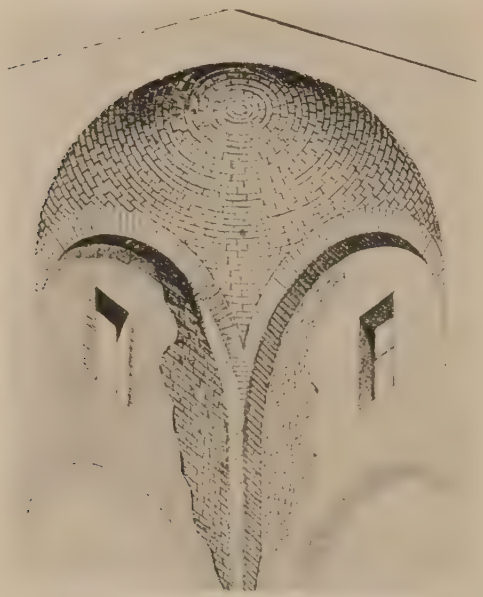


Fig. 34. Dome of Galla Placidia, Ravenna.

The *Mausoleum of Galla Placidia*, founded by that princess and originally known as *Santi Nazario e Celso* (Plate 44), dating from 440, is built of brick greatly differing in dimensions, among which those running 8x30x15 cm. [3.2-x11.9x5.9 in.] and others, not standardized,* measuring 10x43x25 cm. [3.9x16.9x9.8 in.] predominate. For the arches, thinner bricks were used.

The dome (*volta a vela*)† over the central compartment is constructed of bricks set normal to the direction of the vertical curve, a process of construction which we see here applied for the first time in the history of building (Fig. 34). The reinforcing of the dome as well as of the barrel vaults, in the four arms of the cross, consists of amphorae or terra cotta wine jars of various sizes,

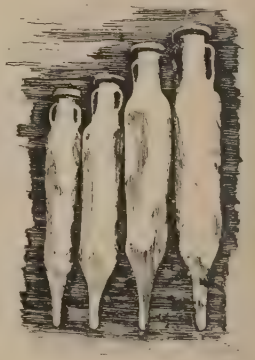


Fig. 35. Amphorae in Dome of Galla Placidia, Ravenna.

*Standardized in the sense of having a width one half the length and a thickness one half the width. [*Ed.*]

†A vault bellied like a sail. It is to be observed that, unlike the subsequent dome of *S. Sophia* at Constantinople, the pendentives of the Mausoleum are a part of the hemisphere whose base is circumscribed about the square supporting it; the pendentives of *S. Sophia* are below the hemisphere whose base is inscribed within the square that supports it. [*Ed.*]

which followed the slope of the roof so that, with a little mortar between, the roofing tiles could be laid upon them (Fig. 35). The stamps upon these tiles were clearly visible in the recent restorations of this famous monument.

Of special interest is the exterior decoration of the Chapel of *San Pier Crisologo* (433-449) showing small pendent arches, each of which is supported by a bracket of cut brick. Worthy of notice are the wall divisions, adorned with these small arches which are separated into twos and fours by pilasters supported on a continuous base (Fig. 36). The cornice is characteristic of this period.

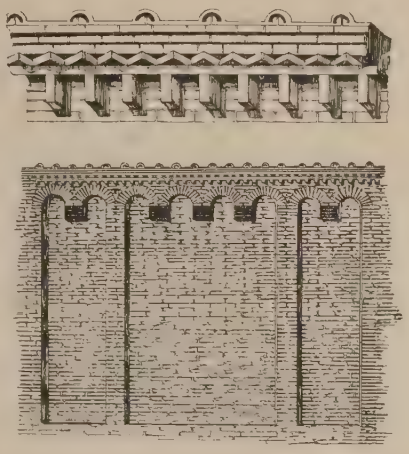


Fig. 36. Wall and Cornice, Chapel of San Pier Crisologo, Ravenna.

The Baptistery of Neone, known also as the *Battistero Ortodosso* or *San Giovanni in Fonte* (449-458), reveals sober and dignified lines (Plate 46). The simple motives of the arched windows and blind arcades are very effective. The cornice, obscured in the illustration by the shadow, consists of the usual row of brick in saw-tooth fashion, between two even courses. We have here the first example of a dome, concealed on the exterior as in *Galla Placidia*, composed of superimposed rows of small terra cotta pipes inserted one into the other (Fig. 37). Of the same period is the interesting Baptistery of the Arians, afterwards the Oratory *Santa Maria in Cosmedin* (Plate 47). It is said to have been originally the octagonal half of a Roman bath.

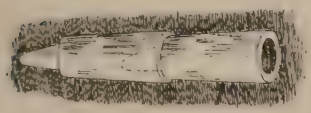


Fig. 37. Clay Pipes in Dome of Orthodox Baptistery, Ravenna.

In *San Apollinare Nuovo*, founded by the Emperor Theodoric as an Arian church about 520 and known as *Sanctus Martinus in Coelo Aureo* until the VIII century, there is a certain attempt at decorative effects in the small projecting arches under the eaves of the nave wall. This is

PLATE 44. Mausoleum of Galla Placidia, Ravenna.

PLATE 45. Palace of Theodoric, Reggia ad Calchis, Ravenna.

PLATE 46. Baptistery of the Orthodox or San Giovanni in Fonte, Ravenna.

PLATE 47. Baptistery of the Arians, now Oratory of Santa Maria in Cosmedin, Ravenna.

a motive which, developed into a notable perspective expression, may be found two centuries later in the so-called Royal Palace, or *Reggia ad Calchis*, built on the ruins of the Palace of Theodoric (Plate 45).

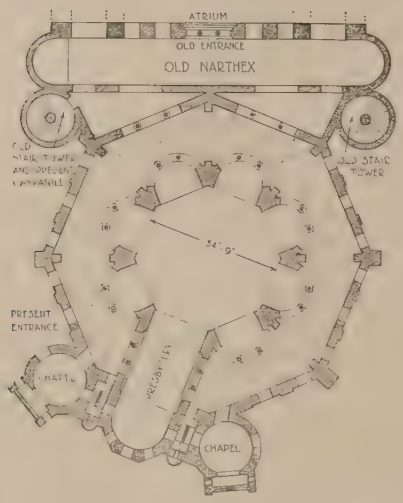


Fig. 38. Plan of San Vitale, Ravenna.

San Vitale, an octagonal domed edifice, built in 526-537 by Julianus Argentarius, was begun under Theodoric and completed under Justinian (Plates 48, 49, and Fig. 38, 39). In his "History of Architecture" (p. 235), Fletcher states that it was modeled after the so-called *Minerva Medica* of Rome (Plate 50), a decagonal Nymphaeum of the Imperial epoch. The bricks vary in thickness from 3.5 to 4.5 cm. [1.4 to 1.8 in.], with the other dimensions conforming to no standard, the size 34x51cm. [13.4x20.1 in.] however predominating. Where new brick have been required for restorations, they have been brought from Imole to meet the requirements of quality. The mortar joints vary from 2 to 5 cm. [0.8 to 1.9 in.], that is, sometimes wider than the thickness of the brick. The crown cornice is composed of five courses of brick, two of which are set saw-tooth fashion in alternation with the other courses. The lower cornice, which is interrupted by the lunette of the XV century portal and marks the division the two stories on the interior, consists simply of three brick courses the center one of which is saw-tooth.

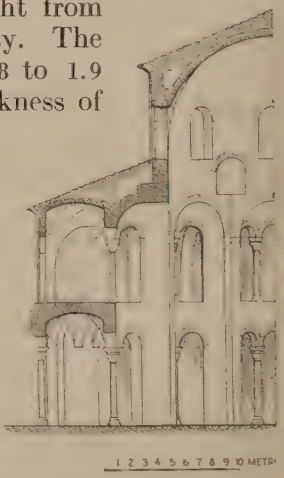


Fig. 39. Section of San Vitale, Ravenna.

The buttresses at the angles of the main octagon which measure 1.58 m. in width by 1.25 m. in projection [5 ft. 2 in. x 4 ft. 1 in.], are worthy of note. They

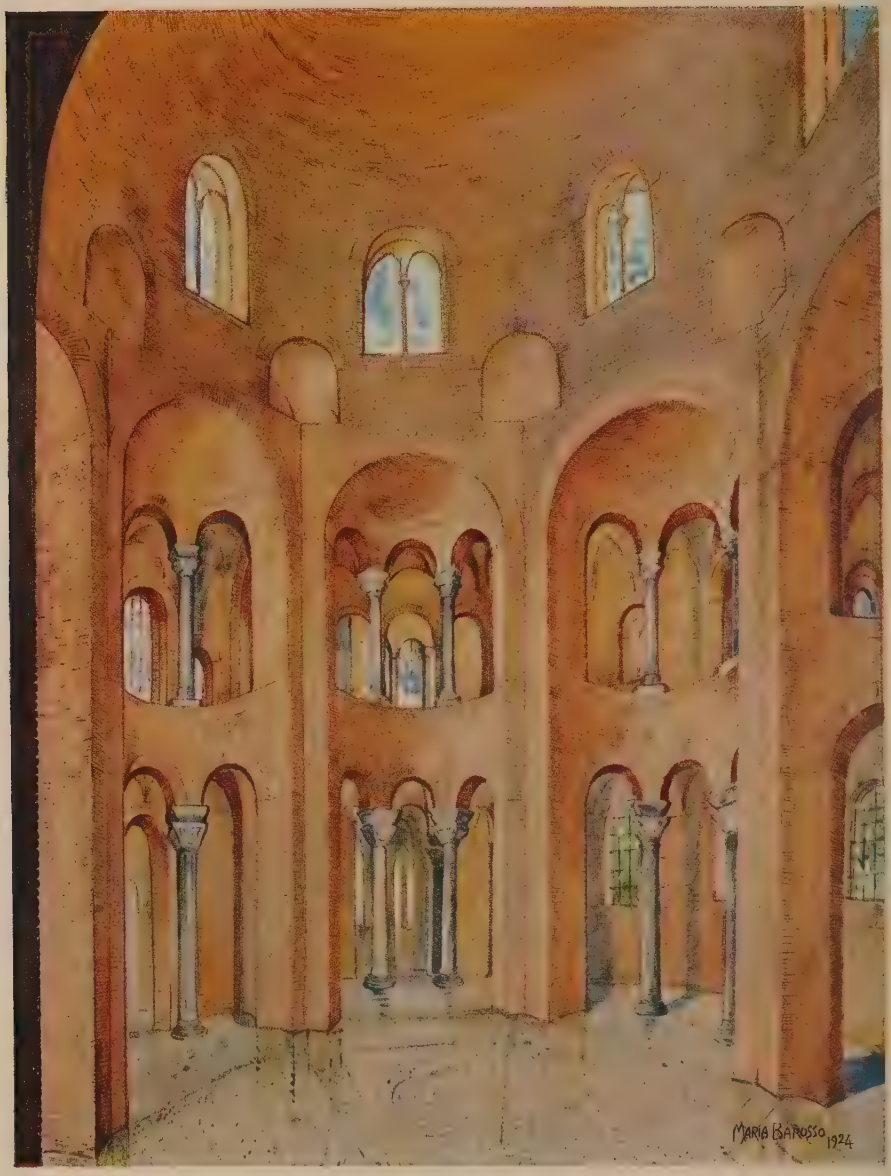

MARIA BARROSO 1924

Plate 49

Interior of San Vitale, Ravenna, Restored

This splendid edifice belongs to the most brilliant period of architecture at Ravenna, the first half of the VI century. It was begun during Theodoric's reign but not completed until 547 when, with solemn rites, it was consecrated in the presence of Justinian—who had but recently recovered Ravenna to the Eastern Empire—and his Empress, Theodora, both of whom are seen in the fine old mosaics of the time which cover the choir apse.

The church is constructed on the central system with spherical dome and, as seen in Fig. 38, is octagonal in form, having originally a forecourt and a narthex on the west front, and a presbytery with apse, extending from one of the sides of the octagon, on the east. Of the two original stair towers on the west front, the south one, which alone remains, was at an early date converted into a campanile and, as seen today, represents a XVII century restoration. The entrance is no longer found through the narthex but is on the southeast beside one of the circular chapels that flank the choir.

On the interior, the great piers enclose semicircular domed niches, pierced into the matroneo *or woman's gallery, and into the lower ambulacrum, by graceful triple arches resting on slender marble columns with finely carved cubical capitals and dosserets. Of special interest are the recesses and squinch arches at the angles of the octagon that serve as pendentives to form the dome. The aquarelle shows the original brickwork free of decorations. The brick, which are of a pinkish yellow tone and of the best quality, such as today come from Imola, are all the way from 13 to nearly 20 inches in length, by one and a half to two inches in thickness, and are laid in heavy joints of lime mortar mixed with crushed brick, fine pebbles, and some flint stone. The central pavement which was raised nearly three feet in 1537 is shown here at its ancient level, even with that of the ambulacrum, in order to give a better impression of the total height of the original structure.*

It would seem that the cupola or niches were neither plastered, painted, nor covered with mosaic in the Byzantine epoch. The stucco and pictures now seen are of the XVI century. The church suffered pillage during early medieval times and lost much of its fine marble veneering. The marble slabs now on the piers belong to the middle of the last century. The present aspect of the church, both on the exterior and interior, with the exception of the Renaissance frescoes in the dome, is due to restorations by Corrado Ricci at the beginning of this century. The church is evidently the prototype of Aix La Chapelle, the splendid mausoleum of Charlemagne.

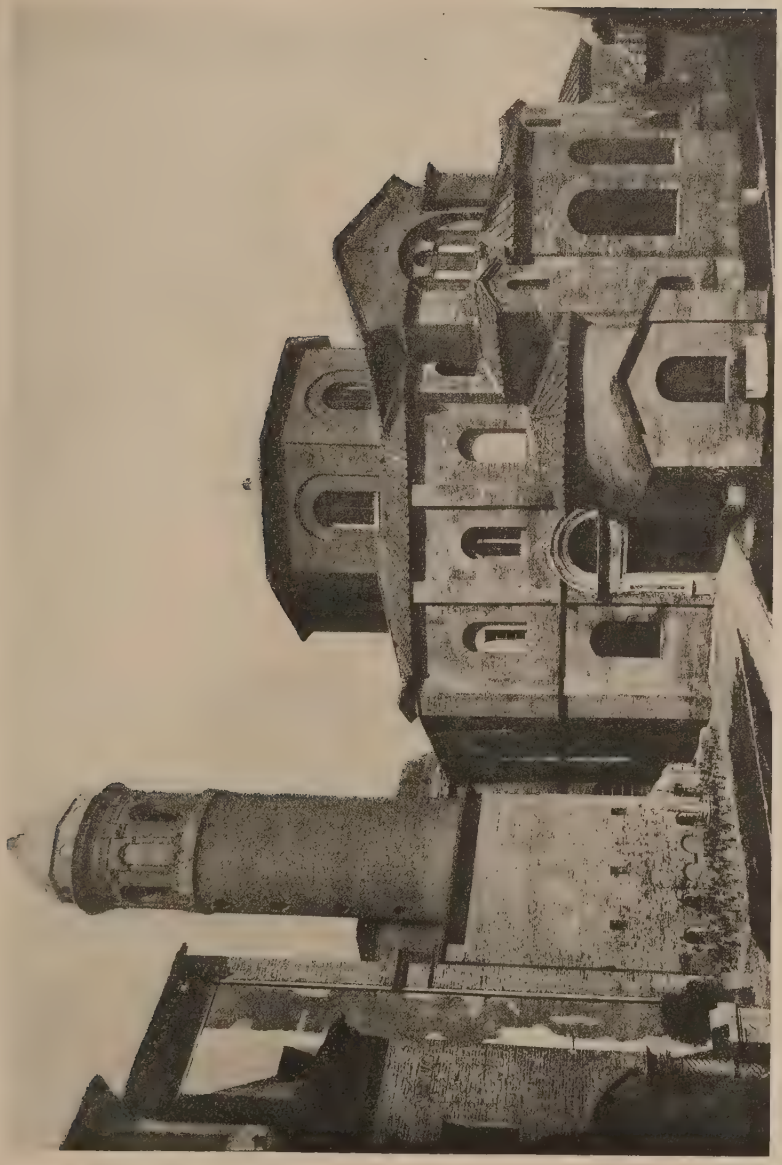


PLATE 48. San Vitale, Ravenna, Restored.

PLATE 50. An Ancient Nymphaeum, the "Minerva Medica", Rome.

are joined by means of brick arches, concealed by the roof, to the pilasters of the cupola. The intermediate pilasters, having a projection of 32 cm. and a width of about 94 cm. [12.6x37 in.], form other vertical lines which rise far enough to intersect the crown cornice. Moreover, a new motive in the architecture of Ravenna may be seen in the two corbeled brackets at the extremities of the apse gable. The cupola is constructed of terra cotta wine jars which form a true spiral coming to a close at the summit. The drum and its structural connections with the octagonal base are in brick and offer new and very interesting solutions of architectural

FIG. 40. Concave Squinch Arch in San Vitale, Ravenna.

PLATE 51. Facade of Sant' Appollinare in Classe, near Ravenna, Restored.

problems, as may be seen in Fig. 40. The passage from the wall angle to the curve of the dome is cleverly managed by a squinch arch over a recess.

San Apollinare in Classe (Plates 51, 52) is another very important monument of the VI century, also constructed by Julianus Argentarius, and on the basilican plan. The brick of a light red tone are 3.5-4x50x34 cm. [1.4-1.8x19.7x13.4 in.] with mortar joints running from 2 to 5 cm. [0.8-2 in.] in thickness.* Here also the sides are decorated with a blind arcade of small round arches corresponding to the interior round-arched arcades, but without any indication of capitals, except in the central nave, on the exterior walls of which may be seen at the impost three projections in as many rows of brick (Plate 53). The apse has the usual brick cornice in saw-tooth between regular courses.

The campaniles at Ravenna are later than the IX century, with the exception of the circular towers of *Sant' Apollinare in Classe* and *Sant' Apollinare Nuovo*, which belong to that period.

*The brickwork of this period had fallen far below that of the early Empire, but was far better than that of the following centuries, well up into the XI century. In the XII century, however, bricklaying in Lombardy reached the highest excellence, as at Pavia, Modena, Milan, etc. [*Ed.*

PLATE 52. Sant' Apollinare in Classe, Apse and Tower, near Ravenna.

PLATE 53. Sant' Apollinare in Classe, Aisle and Nave Wall, near Ravenna.

PLATE 54. Campanile of Sant' Agata, Ravenna.

PLATE 55. Campanile of Santi Giovanni e Paolo, Ravenna.

PLATE 56. Campanile of San Giovanni Evangelista, Ravenna.

PLATE 57. Santa Maria in Porto Fuori, Ravenna.

Plate 58

San Francesco and the Dante Memorial, Ravenna

San Francesco, a detail of which is here shown, was founded, according to tradition, as early as 450 by Archbishop Crisologo or Neone and dedicated to Sts. Peter and Paul, but commonly called San Pietro Maggiore. *After the Franciscans were granted the church in 1261, they gave it the name of their founder. Little remains of the ancient construction besides the crypt. The tower is of the IX century, and the general form of the church belongs to the Romanesque period. Extensive restorations along the old lines have recently been completed (1921). It was in the narthex of the old church that the remains of Dante were first deposited, on his death here in 1321. Guido da Polenta, Lord of Ravenna, failed in his intention of providing a fitting tomb for the divine poet, an intention carried out however by Bernardo Bembo of Venice, father of the famous Cardinal Bembo, in 1482, who had Pietro Lombardi erect the square, domed marble sepulchre where the sacred ashes were finally deposited. The tomb as seen today was rebuilt in 1780 by Camillo Morigia.*

The charming little brick chapel with its belfry, seen at the left, was built (at the back of the tomb) in 1921 as a Dante museum, to commemorate the six hundredth anniversary of the poet's death. On the silver bell which is rung at vespers every evening is inscribed two stanzas from the opening of the VIII Canto of the Purgatorio:

Era già l'ora che volge il disio
ai naviganti e intenerisce il core
lo dì c'han detto ai dolci amici addio;
e che lo novo perigrin d'amore
punge, se ode squilla di lontano,
che paia il giorno pianger che si more.

Now was the hour that wakens fond desire
In men at sea, and melts their thoughtful heart
Who in the morn have bid sweet friends farewell;
And pilgrim newly on his road with love
Thrills, if he hear the vesper bell from far
That seems to mourn the expiring day.

Cary

FIG. 41. Drawing of Façade and Tower, San Francesco, Ravenna.

In origin, the campanile of *Sant' Agata* (Plate 54), goes back to the earlier period, but as seen today represents a reconstruction of the XV century. The bell tower of *Santi Giovanni e Paolo* (Plate 55), is perhaps the earliest of all, dating as far back as the VI or VII century. The square campaniles of *San Giovanni Evangelista* (Plate 56) and of *San Francesco* (Plate 58, Fig. 41) belong to the XI century. Somewhat later is the campanile of *Santa Maria in Porto Fuori* (Plate 57), which rises from a massive base said to have belonged to an ancient light-house.

PLATE 59. Campanile of Sant' Apollinare Nuovo.

The tower of *Sant' Apollinare in Classe* (Plate 52), about 40 meters high [131 ft.] with walls 1.5 m. thick [5 ft.] is built of bricks of very different dimensions, some of which probably came from demolished buildings. A few traces of horizontal cornices are preserved and each story has openings of one-, two- or three-arched lights. The campanile of *Sant' Apollinare Nuovo* (Plate 59), like the preceeding, has cornice lines at each story either saw-tooth or simple bands of projecting brick. The crown cornice is made up of two saw-tooth courses which alternate with regular courses. Another characteristic decoration, which has partly disappeared, is here composed of bowl-like ornaments of glazed terra cotta, of which two may be seen over the last three-

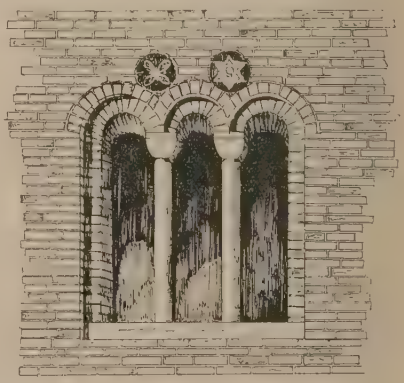


FIG. 42. Window in Campanile of Sant' Apollinare Nuovo, Ravenna.

PLATE 60. Abbey Church of Santa Maria in Pomposa, near Codigaro.

PLATE 61. Old Parish Church, Bagnacavallo.

light opening, with reliefs in green, red, and old gold at the centers (Fig. 42). The varied treatment of the same motives in the campanile of *Sant' Agata* is worthy of note (Plate 54).

In other localities contiguous to the Romagna, we find the same forms established at this time. At Pomposa, in the province of Ferrara, the Church of *Santa Maria* (Plate 60) was built in a manner absolutely similar to the monuments mentioned thus far, with the two characteristic bracket-shaped projections at the extremes of the gable, as we see in *San Vitale* and *Sant' Apollinare in Classe*. The portico, added in 1026, is also in brick of the prevailing type, and bears upon its face detailed symbolical bas-reliefs which form a beautiful decoration. Of special interest is the campanile 50 meters [164 ft.] in height, built in 1063. It follows faithfully the forms of the past with the exception of some details of the cornices and the round majolica ornaments which are found in great profusion.

The *Pieve* (Parish Church) of Bagnacavallo, between Faenza and Imola, belongs to the V or the VI century at the latest (Plate 61). This church was also built in the same manner and with the same materials as the churches of Ravenna. It

reminds us forcibly of the Basilica of *Sant' Apollinare in Classe* both because of the two projections at the extremities of the gable and the elevation of the walls of its façades above the roof, meant to give greater elegance and slenderness to the edifice. The well-preserved sides are decorated on the exterior of the central nave with the usual series of small blind arches, having alternate pendent supports while the pilasters rise from a band a little above the roof of the side aisles. Above the small arches is the usual cornice of a saw-tooth course between two flat courses. The round campanile of the IX century was destroyed at an early date.

FIG. 43. Detail of Aisle Wall, Santa Maria della Caccie, Pavia.

San Lorenzo Maggiore[1] at Milan also goes back to the VI century. On the exterior of the original wall is a brick facing ornamented at the sides with pilasters corresponding to the interior arcades as in *San Vitale*. The edifice as it appears today is due to a reconstruction of the XVI century, following the forms of the original, upon the same foundations. With an octagonal plan, it is reinforced at the corners by sturdy buttresses.

Many other edifices, originally built of brick, have almost totally lost their real physiognomy, as has happened, to cite one of the greatest examples, in case of St. Mark's at Venice.

LONGOBARD AND PRE-LOMBARD PERIOD[2]

Alongside of the Byzantine, and interacting with it, there was being developed a type of architecture which naturally came to

1. DE DARTEIN: *Etude sur l'architecture lombarde et sur les origines de l'architecture romano-bizantine.* 2. CORDERO: *Dell'architettura italiana durante la dominazione longobarda.* TROJA: *Codice diplomatico longobardo.* MARZARIO: *I maestri comacini.*

be known generally as the Romanesque, based as it was on the early Christian adaptation of the Roman basilican or, as others say, house plan, and which especially in Northern Italy fell under a powerful Lombard influence. The beginning of the period may be assigned to the time of the Longobard king Authari (584-591), and, continuing under his successors Theodelinda and Agilulf (592-615) down to the days of the Carlovingian, Charlemagne (768-814), may be said to have extended as a pre-Lombard influence to the beginning of the XI century.*

The center of this art was Milan, which had enjoyed an artistic preparation from the time when the Roman Emperor, Maximianus (286-305), chose it as his residence. Later, with similar forms, we see the center of this art shifted to the vicinity of Rome, especially showing fine examples around Viterbo. During this early Longobardic period of development, brick seems to have been little used, and then generally in combination with stone. The historical and religious documents of the time[1] have been searched in vain to find any information on the manufacture of brick which, however, could not have been entirely abandoned as attested by the material of various monuments, especially those of the time of Charlemagne, such as the exterior of the small nave of *Santa Maria delle Caccie* at Pavia (Fig. 43), the construction of which preceded by perhaps thirty years the conquest of Charlemagne over the Longobards.

Due to the scarcity of both monumental and literary remains on the subject, it is very difficult to form an idea of primitive Longobardic brick architecture. The authoritative writings of

*The invasion of the barbarian Longobards into northern Italy, in the VI century, at first had a disastrous effect on all forms of art, already in a sad state of decay. Their conversion to Christianity, however, led to a renewed interest in art, especially in ecclesiastical building which, during their two centuries of control, showed under such rulers as Theodolinda and Luitprand a commendable advance, based as it was upon forms already found in the conquered territory. The able and vigorous administration of Charlemagne gave an impetus to further development in building practice, but the decay of his unwieldy empire, under his sons, and the consequent general confusion and strife, together perhaps with the growing apprehension of the coming end of the world, reduced architecture in the latter half of the IX and the whole of the X centuries to the lowest condition. With the XI century, however, there was an evident awakening to human interests, as seen in the rise and growth of the Communes, the expansion and development of the trades, the general betterment in social and economic conditions which, together with the tremendous stirrings of the XII century Crusades, resulted in a period of decided advance during which the Lombard-Romanesque manner attained its majority and not only profoundly affected, for two hundred years, the ecclesiastical and civic constructions of Italy and the rest of Europe, but made possible the pointed architecture of the XIII century. [*Ed.*]

1. ANASTASIO, THE LIBRARIAN: *De vitis romanorum pontificum.*

PLATE 62. Santa Maria in Cosmedin, Rome.

Paulus Diaconus[1] is of little value here as he limits himself rather to expressions of admiration than to exact information.

In pre-Lombard times we find at Rome, artistic tendencies still bound to past forms, as in the Church of *Santa Maria in Cosmedin* (Plate 62) said to have been originally built by a Byzantine colony in 775 upon the ruins of a Temple of Ceres-Bacchus and Proserpine. The Church as we see it today has undergone various changes and restorations. The campanile goes back to the beginning of the XII century. Much the same may be said of the neighboring Church of *San Giorgio in Velabro* (Plate 63), the portico of which, however, probably belongs to the XIII century. In the campaniles of these two churches we have admirable examples of that form of construction in the detached bell tower which peculiarly belongs to this period and which, as a marked characteristic of the Romanesque, is said to have originated as early as the VI century. In these tall, graceful campaniles of Rome, illustrated in Plates 64-67, the work strikingly simulates the old Roman methods both in the brick facings and in the very perfect round arches.

New forms at Rome are found in the cloisters of *Santa Francesca Romana*, originally *Sancta Maria Nova*, of the XI century, some features of which are surely related to motives found in the campaniles. The cloisters are especially worthy of study as examples of fine brickwork of the period (Plates 68, 69; Figs. 44-46).

A curious example of a very prevalent practice of the times is found in the House of *Niccolò di Crescenzio* (Plate 70), of the XII century, erroneously known as the House of Rienzi, or more plausibly called the House of Pilate, as it was used as one of the Stations of the Cross in medieval processional ceremonies. It is constructed of odds and ends gathered from the ruins of older buildings and shows considerable ingenuity, but the whole is bizarre and reveals careless workmanship, as seen in the wide joints of crude unseasoned mortar (Plate 71).

Santa Fosca on the island of Torcello near Venice, consecrated in the year 1011, shows certain features of the Ravenna apses with its graceful arcades (Plate 72). It may well be con-

1. Paolo Diacono: *De gestibus Longobardorum*—a writer of the early VII century.

MARIA BAROSSO. ROMA
1913

Plate 63

San Giorgio in Velabro, Rome

A church near the old cattle market, or Forum Boarium, *at the southwest of the Palatine in the* Velabrum, *a region along the western foot of the Palatine, which extends from the Forum to the Circus Maximus. It was founded, it is thought, in the* v *century in honor of the warrior saint, St. George who, with St. Theodore and St. Sebastian, was one of the protectors of the imperial troops. Abandoned in the* ix *century for sanitary reasons, it was restored in the* xii, *at which time was erected the charming Romanesque campanile shown in the aquarelle. Though often restored since, and even now undergoing restorations, it retains its original air of a venerable antiquity from which is not absent a Byzantine feeling.*

In the third story of the campanile is seen a group of three windows above the xii *century portico. The upper stories are symmetrically treated with triple arches on each side, one directly above the other, and provided with band courses at the imposts running around the tower. The last story is lightened by the open trifora with slender marble columns, thus forming an airy loggia at the top. The stories are of equal height and separated by cornices of saw-tooth brick courses, supported on small marble brackets. The ensemble is sturdy but graceful and harmonizes well with the nearby solemn ruins of the Palatine, the western slopes of which are seen in the background.*

Beside the portico is seen the small marble Arch of the Money Changers which the silversmiths and merchants of the Cattle Market erected in honor of Septimius Severus (193-212). On the right, is the great marble Janus Quadrifrons, *a four-arched entrance to the Market, supposed to have been erected in honor of Constantine. It is of interest because of its vaulted crossing which clearly anticipated the structural practice of the subsequent medieval period.*

PLATE 64. Campanile of Santa Maria Maggiore, Rome

PLATE 65. Campanile of Sant' Eusebio, Rome.

PLATE 66. Campanile of Sta. Pudenziana, Rome.

PLATE 67. Campanile of Sta. Croce in Gerusalemme, Rome.

MARIA BAROSSO

Plate 68

Detail of the Old Cloister of Sancta Maria Nova, Rome

This charming composition represents a bay on the ground floor of the cloister. The cloister has a square plan of 46 feet on a side, each of which originally consisted of an arcade of twelve round arches supported on columns of white marble, and surmounted by a cornice similar to those seen on the Campanile. For static reasons, these were replaced by sturdy arcades with segmental arches resting on piers, of irregular hexagonal sections, with simple low marble capilals as seen in Figs. 44-46.

In the aquarelle, we have presented a bay on the side which in part has preserved the old XII century arcade, by dividing it into groups of three marble columns, with their two whole and two half arches, and incorporating them between solid quadrilateral piers (Figs. 44, 45 b).

From the fragment of the cornice may be seen what really charming effects may be secured by the use of very simple means—just the right projection of plain and saw-tooth brick courses, between which are the marble brackets of just the right size and shape, and with just the right spacing. The double relieving arch of immense brick is reminiscent of the ancient Roman work.

MARIA BAROSSO · ROMA
1929

Plate 69

Cloister of Santa Francesca Romana, formerly Sancta Maria Nova, Rome

The cloister, adjoining the church, occupies the area of the old Temple of Roma, on the Forum side. The church of Sancta Maria Nova *which arose in the* IX *century took over the privileges of the ancient Basilica of* Sancta Maria Antiqua *which from the* VI *century on had stood in the Forum at the western foot of the Palatine but had in time to be abandoned. The cloister is of very elegant medieval brick construction contemporaneous with the campanile.*

To the ground floor, obviously heavy in its pure monastic style, the portico of the first story forms a gracious contrast (Fig. 44). Entirely preserved on its four sides, each with four arches supported on octagonal brick columns, it reveals a pure Italian style of the XV *century. The octagonal columns have stone bases and capitals, with stone coping on the parapet between them.*

The second story is enclosed on two sides by the walls of the old convent and has on the other two sides respectively a wide terrace and a portico with a charming series of seven arches.

It was in 1425 that Francesca de' Ponziani, of a noble family, founded the Oblate order of saintly women in offering herself and ten companions as an oblation to God before the altar of Sancta Maria Nova. *On her death (1440), she was buried in the church which, after her canonization (1608), was given her name,* Sancta Francesca Romana. *The order she founded, still active, follows in general the Benedictine rule but the life of the devotees is not cloistral.*

Pope Clement VI, in 1352, established here the Benedictine monks of the congregation of Monte Oliveto Maggiore, *who still administer the church. The convent, however, is now occupied by the Office of the Forum Excavations, and contains antiquities found in the Forum. The cloister was restored by the Italian government at the beginning of this century and is now the property of the state.*

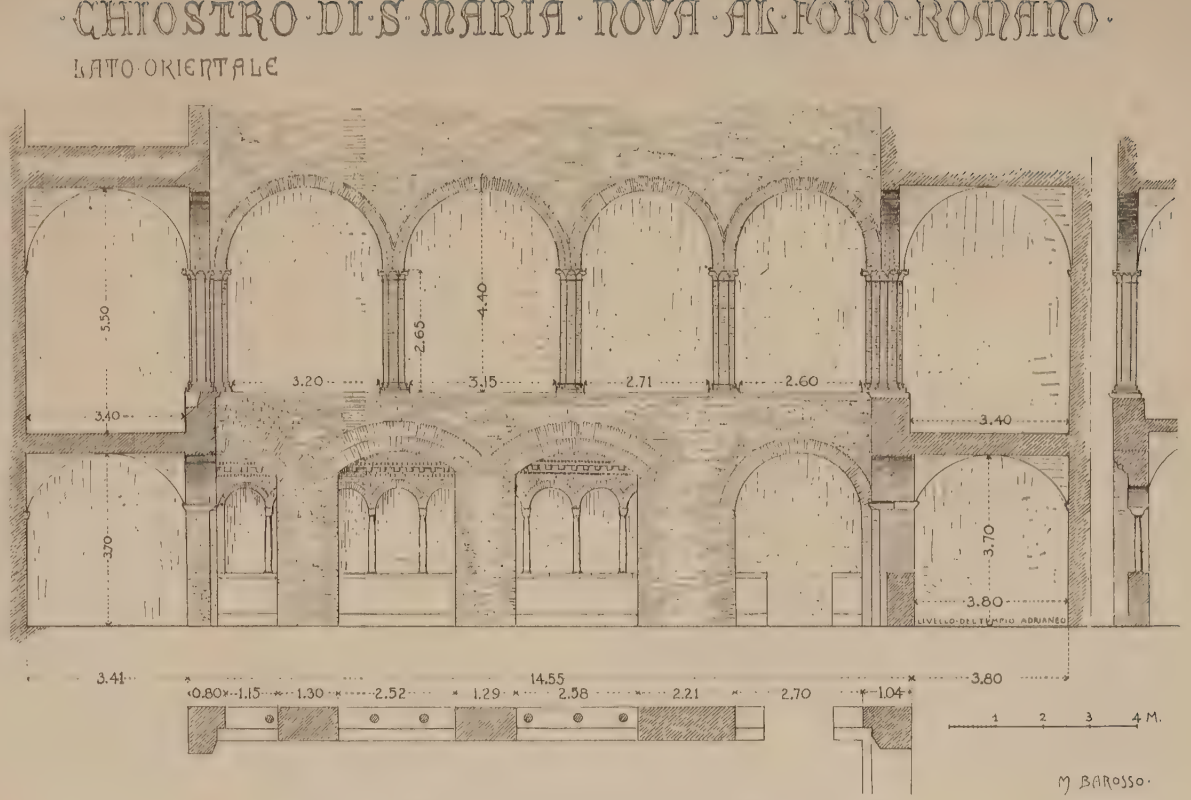


FIG. 44. East Elevation of Cloister of Sancta Maria Nova, Rome.

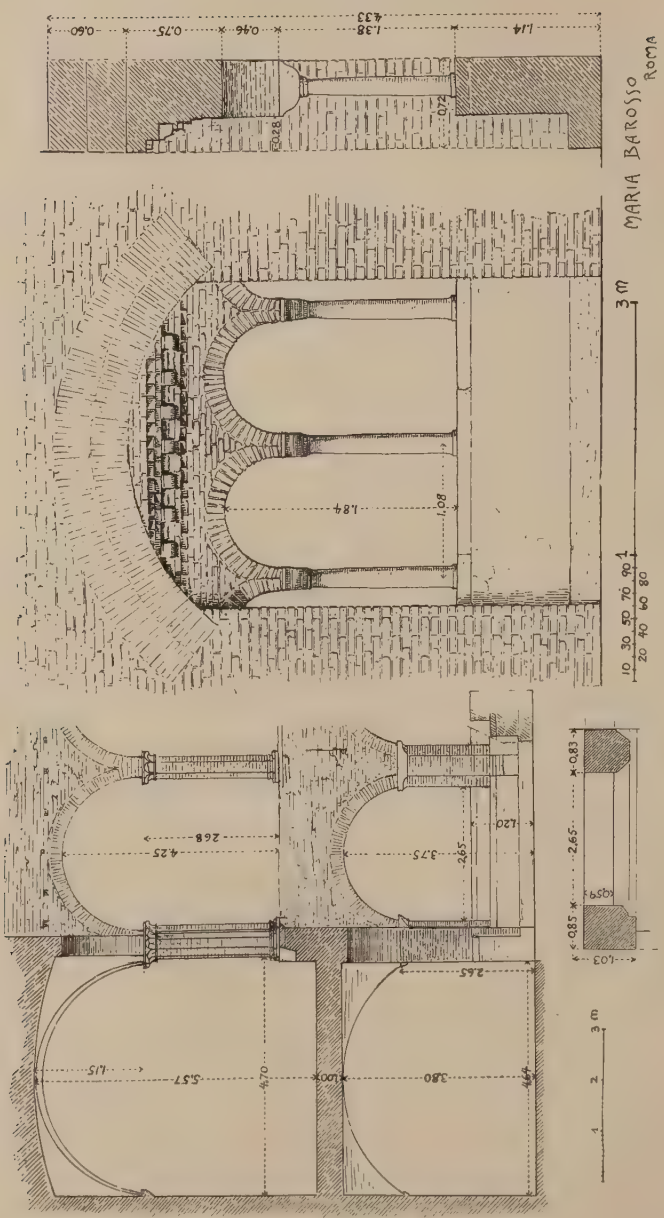
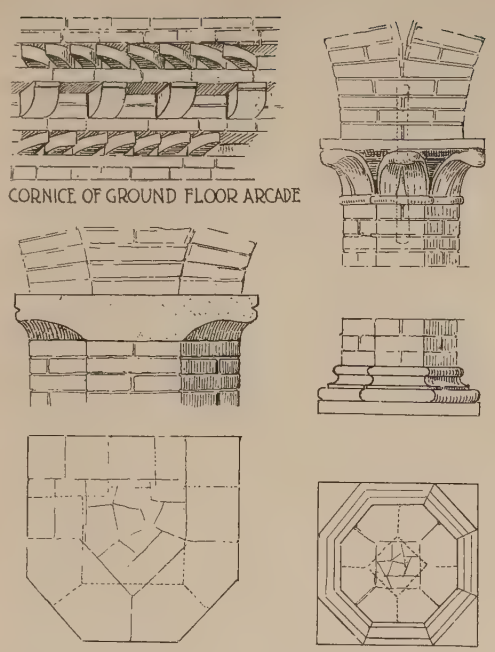
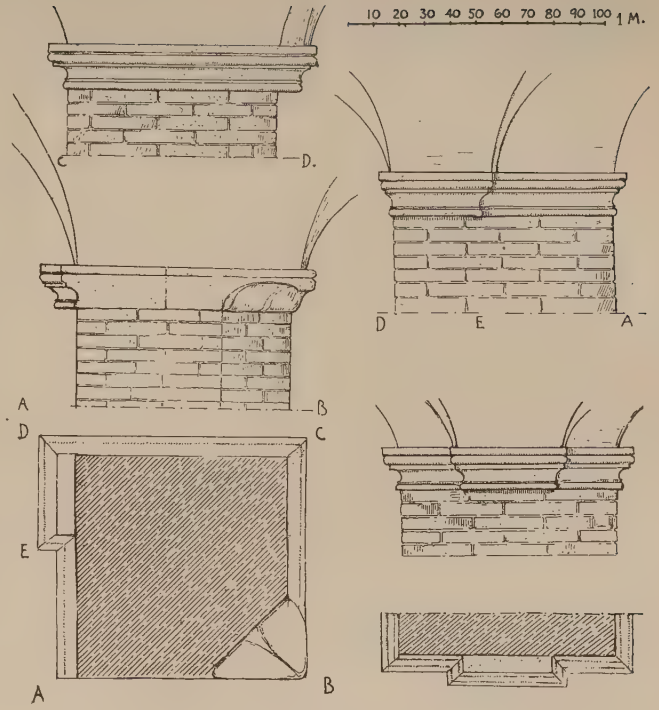


FIG. 45. Details in Cloister of Sancta Maria Nova, Rome.





a. Lower Piers, Upper Columns.

b. Lower Piers.

FIG. 46. Details in Cloister of Sancta Maria Nova, Rome.

PLATE 70. The Crescenzio House, or "House of Rienzi," Rome.

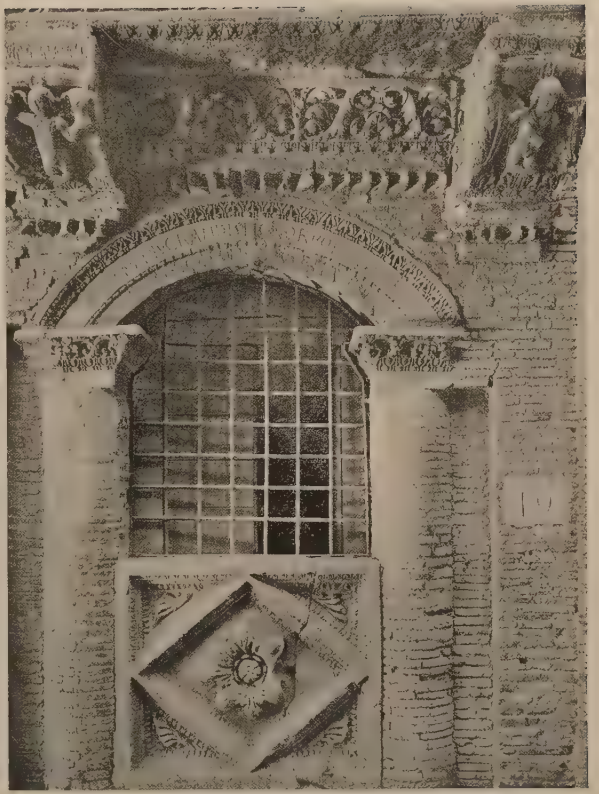


PLATE 71. Detail of the Crescenzio House, Rome.

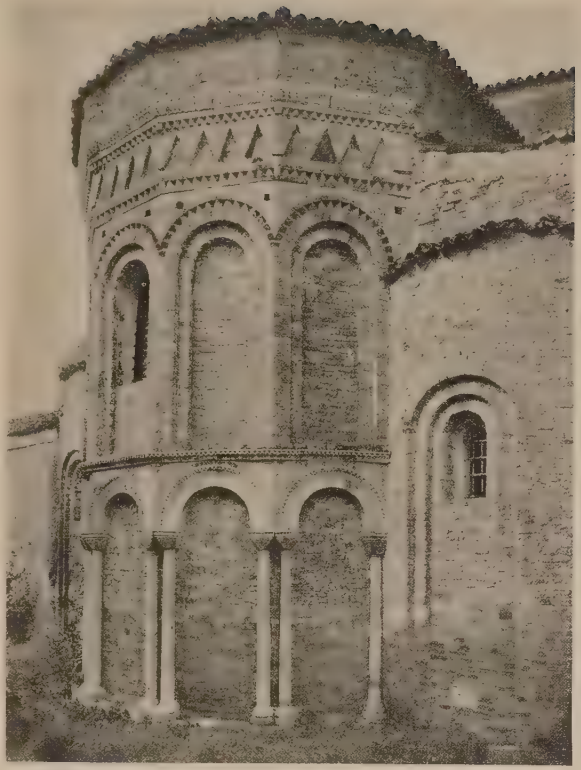


PLATE 72. Apse of Santa Fosca, Torcello.

PLATE 73. Apse of San Giovanni Evangelista, Ravenna.

PLATE 74. Abbey Church, Vezzolano.

PLATE 75. Abbey Cloister, Vezzolano.

PLATE 76. Apse and Campanile of Abbey Church, Vezzolano.

PLATE 77. Rear View of Cathedral, Parma.

PLATE 78. San Pietro in Ciel d'Oro, Pavia.

PLATE 79. San Teodoro, Pavia.

sidered as a development of the apsidal architecture of *San Giovanni Evangelista* (Plate 73).

Of special note is the *Badia* (Abbey Church) of Vezzolano (Plate 74) in Piedmont which, with its fine red brick vividly contrasting with the surrounding verdure, has been beautifully preserved for nearly a thousand years. Erected at the beginning of the XI century upon the foundations of an old Longobard church,[1] belonging perhaps to the times of Charlemagne, its brick facing in part variegated by sandstone courses and adorned by three slender columned galleries, it clearly betrays French influence.[2] The facing is very carefully executed and, as will be seen, rises above the roof of the nave to the great advantage of the architectural ensemble. Worthy of note is the difference in the treatment of the cornices on the front and sides. With the buttresses and columniation, the façade gable bears a restrained cornice made up of saw-tooth and plain brick courses on simple brackets, while on the exterior of nave and aisles the cornices are elaborated into a graceful line of interlacing pendent arches,

1. BOSIO: *Storia dell' antica Abbazzia di Vezzolano.* 2. RIVOIRA: *Le origini dell' architettura lombarda.*

PLATE 80. General View of Sant' Ambrogio, Milan.

PLATE 81. Atrium and Façade of Sant' Ambrogio, Milan.

resting on brick corbels or stone consoles which themselves are also joined by little sub-arches. The same treatment is seen in part on the apse (Plate 76). Here gable, apse, and tower form a picture of exquisite composition. The charming little XI century cloister reveals a touch of later Gothic influence (Plate 75).

At Parma, we find in the oldest part of the Cathedral (1058-74), the choir and apse, forms remarkably developed in their ensemble and still connected in detail with the preceding period. Here very carefully wrought out decorations in terra cotta, for the most part made in terra cotta moulds, vivify the whole. The apse (Plate 77) has a cornice of simple moulding under which there is a saw-tooth course of brick between two other courses set even; immediately below is a series of arches with terra cotta animals and leaves in the background. Then comes a light, accessible, arcaded gallery with colonettes resting on a slender base, below which there is still another saw-tooth course of brick, surmounting a series of gracefully intersecting arches. Finally, there is a very tall blind arcade, a detail of its archivolts being repeated in other parts of the building.

We come now to Pavia with its sumptuous Basilica of

PLATE 82. Atrium and Canon's Tower, Sant' Ambrogio, Milan.

Courtesy of Prof. Porter and Yale University Press.

PLATE 83. East End and Apse of Sant' Ambrogio.

Courtesy of Prof. Porter and Yale University Press.

PLATE 84. Apse of Sant' Eustorgio, Milan.

San Pietro in Ciel d'Oro as reconstructed[1] in 1132 and restored at the end of the last century by Angelo Savoldi (Plate 78). The facing, of a beautiful clear red brick, is here worked out with a care that would be impossible to find in preceding monuments. The three great arches, supporting a light projection on the lower part of the façade; the decoration under the slope of the roof, secured by the stepped arcade with its delicate play of interlaced pendent arches and cornice above; and the crowns of the unequal buttresses which mark the divisions of nave and aisles, are features that arrest attention.

The brick are of a beautiful clear red and of smooth surface, something not observed hitherto; and the artisan has given attention to every detail, carefully setting small round terra cotta ornaments in the spandrels of the arches as well as at the top of the larger buttress. Everything about this façade indicates such progress in the workmanship of brick wall construction as to suggest that there were new and specialized guilds of master masons and a revival of brick manufacture. In fact,

1. According to some historians.

Courtesy of Professor Porter and Yale University Press.

PLATE 85. Baptistery of Cathedral, Biella.

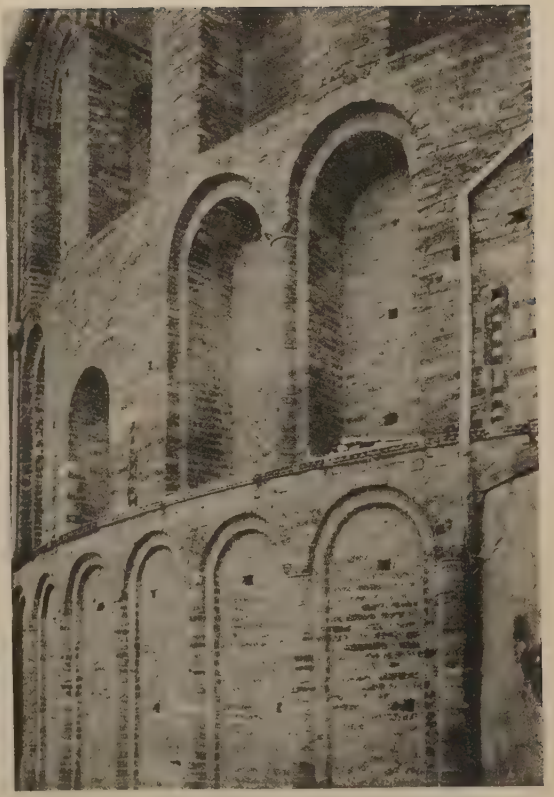


PLATE 86. Detail of Apse of Santa Sofia, Padua.

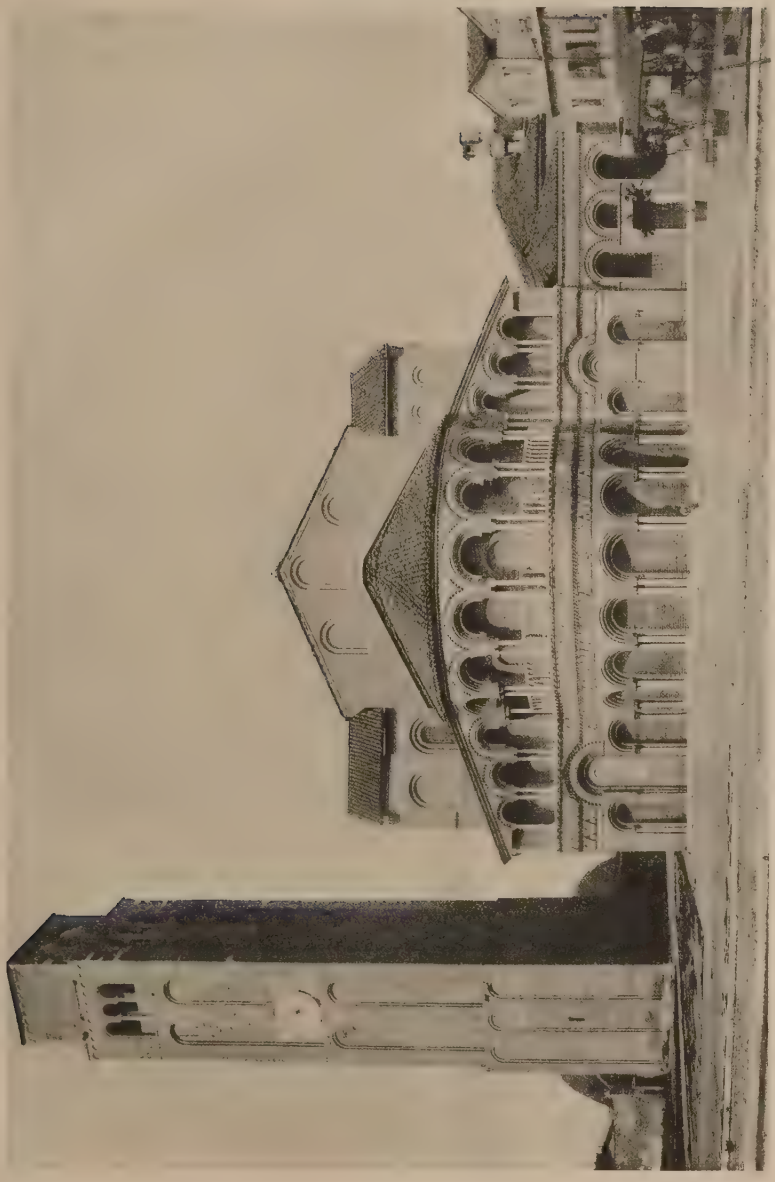


PLATE 87. Apse and Tower of Santi Maria e Donato, Murano, Venice.

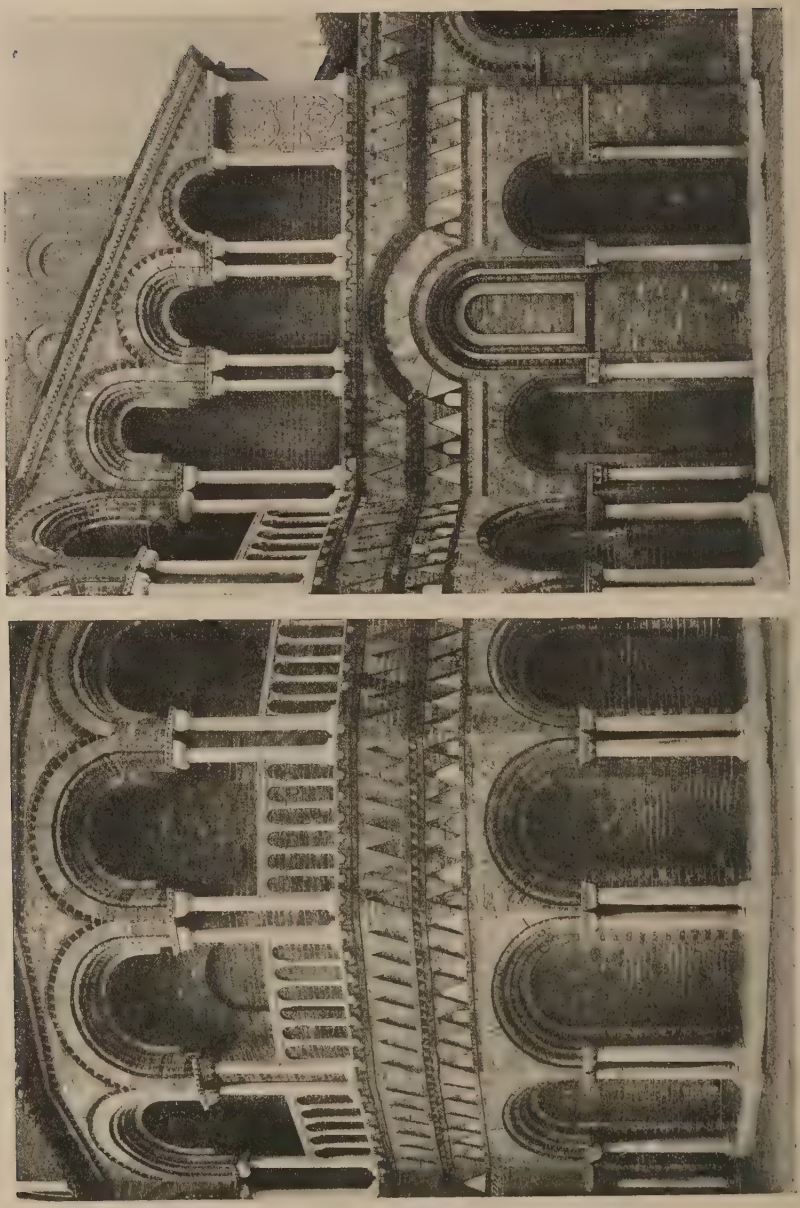


PLATE 88. Details of Apse, Santi Maria e Donato, Murano, Venice.

MARIA S. ARCOSO
ROMA

Plate 89

Apse of Sts. John and Paul, Rome

This venerable structure, as we see it today, is a XII *century reconstruction of an older church built, tradition has it, on the site where lived, and were afterwards interred, the two Christian brothers, John and Paul, who were high court officials in the house of Emperor Constantine II, and who suffered martyrdom in the days of Julian the Apostate (360-363).*

The aquarelle shows the apse and side of the church, and the fine brick arches over the ancient Clivus Scauri *(Via SS. Giovannie e Paolo), thought to have belonged to the old house of the* IV *or* V *century. The elegant loggia about the upper part of the apse is the unique example in Rome of this typical Lombard form. The series of small round arches, supported upon marble columns with bracket capitals, which project from the curved wall of the apse, produce a most gracious effect of light and shade, as the cold white of the marble trim accentuates the golden red of the brick, of which also the church and arches of the* Clivus *are built. The crowning cornice of the apse, like those in the stories of the neighboring campanile, are formed of courses of moulded brick dentils, and marble brackets. The perforations below, in line with the columns, were perhaps once filled with marble or majolica adornments.*

The wall between apse and street arcade belongs to old Roman construction in which is seen remains of reticulated work which may be attributed to the first century of the Empire. The arcade of the street, extending a distance of nearly 100 feet, consists of double ring arches of bipedales 14 feet apart, with a span of from 16 to 20 feet, and are built of a beautiful cinnabar red brick. The whole color effect of these architectural masses lying on the western slope of the Caelian Hill, as seen in the last rays of the setting sun, is entrancing.

Courtesy of Prof. Porter and Yale University Press.

PLATE 90. Apse of San Pietro Vecchio, Brusasco, Piedmont, Restored.

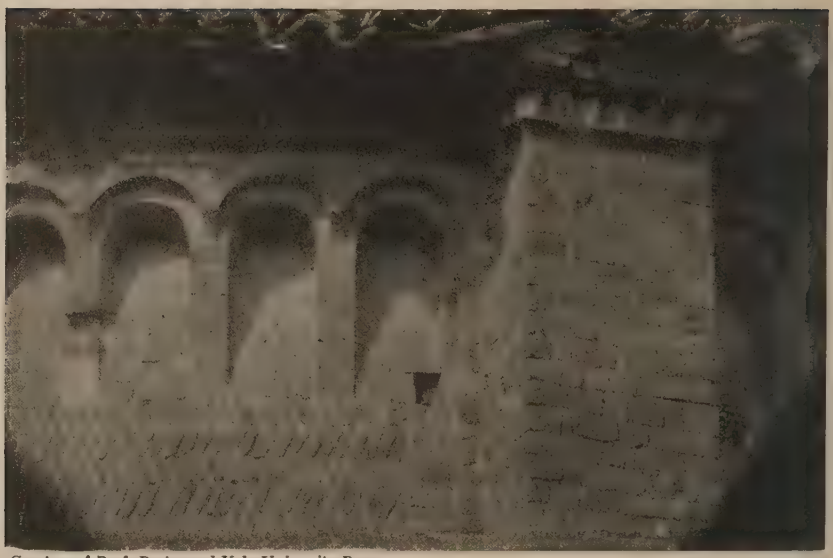
it was a time when brick masonry reached its highest development in the Middle Ages. Another Lombard church of the same period at Pavia is that of *San Teodoro* (Plate 79). Of very ancient foundation, it represents in its present form, as restored by Zuradelli and Moiraghi (1887-1909). a simple and restrained original of the early XII century. Less ornate than *San Pietro in Ciel d'Oro*, it reveals an obvious similarity of form.

THE LOMBARD-ROMANESQUE PERIOD

In Italy during this period, covering the XI, XII, and in part the XIII centuries, not only religious edifices but municipal buildings or communal palaces assert themselves by reason of their distinguished artistic forms.

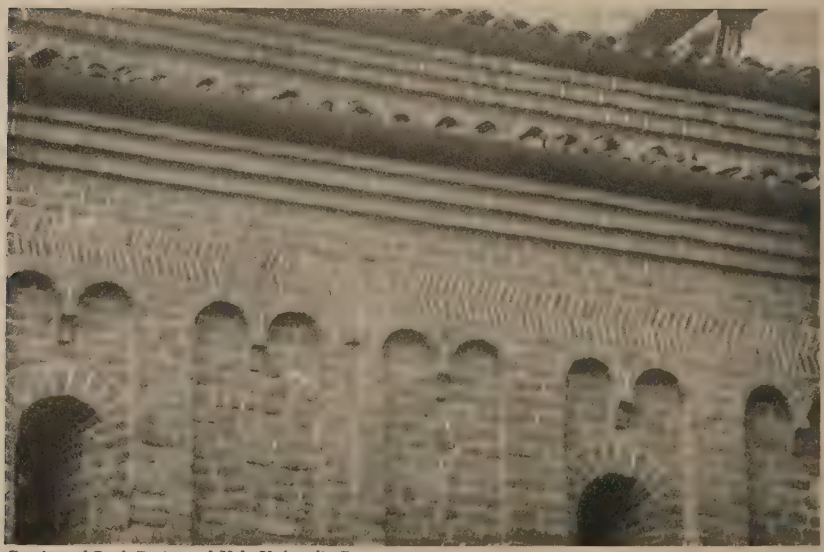
A really famous monument of brick construction is the Basilica of *Sant'Ambrogio* at Milan (Plate 80), mother and queen of Lombard churches,[1] perhaps originally founded about 386 by St. Ambrose himself. It was rebuilt in sections, according to Cattaneo, the apses and the side chapels in the IX century

1. DE DARTEIN: op. cit.



Courtesy of Prof. Porter and Yale University Press.

PLATE 91. Detail of Apse, Santa Maria, Calvenzano.



Courtesy of Prof. Porter and Yale University Press.

PLATE 92. Detail of Cornice, San Sepolcro, Milan.

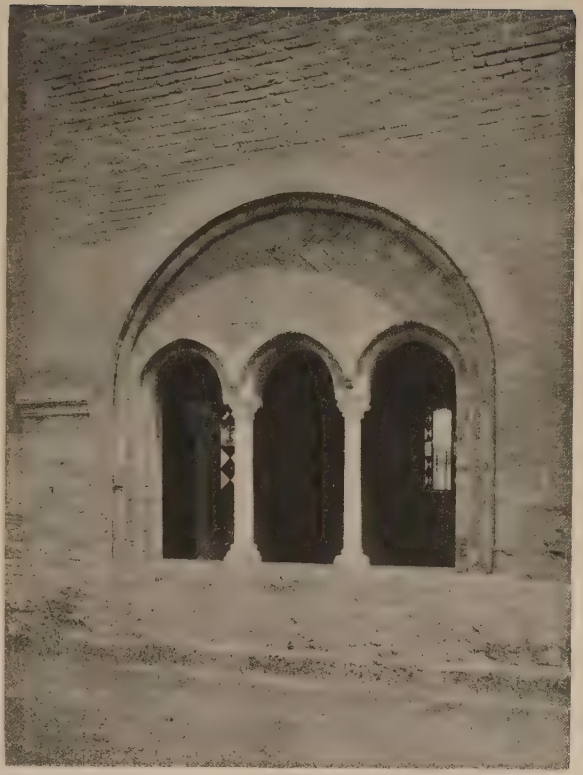


PLATE 93. Detail of Chapter House Wall, Abbey of Staffarda.

PLATE 94. Detail of the Arengario, or Town Hall, Monza.

PLATE 95. San Lorenzo, Mantua, Restored.

PLATE 96. Detail of San Lorenzo, Mantua.

and the nave, aisles, and narthex in the second half of the XI century. The façade, with the characteristic upper gallery (Plate 81), is certainly of the XI century; the atrium is later, probably belonging to the beginning of the XII century. The left campanile (Plate 82), *dei Canonici*, was built between 1128 and 1144, while that on the right, *dei Monaci*, seen in Plates 80, 81, belongs to the IX century.

The facing of the older campanile, so devoid of decoration and done with such little care, proves its difference in date from the rest of the monument, in which we find new forms, and in which the slopes of the roof are defined by a brick cornice. This cornice begins with a saw-tooth course and is supported by a row of small pendent arches such as we find in the cornice of the lower story, and also in the cornices of the various stories of the later campanile, on the left.

The apse is also very interesting (Plate 83). Above, it is embellished by an order of deep arched niches, supported every third niche by pilasters of 30x10 cm. [11.8x3.9 in.], which descend to rest on a single base and divide the wall into five sections. This is a wholly new method of decoration which appeared later in many other brick edifices, such as *San Vincenzo in Prato; Sant' Eustorgio* (Plate 84), and *San Celso*, at Milan; and in the Baptistery of the Cathedral of Biella (Plate 85). An advance is made in the apse of *Santa Sofia* (Plate 86), said to be the oldest church in Padua, while still later it developed with more elegance into a series of accessible galleries, as in the apses of *Santi Maria e Donato* on the island of Murano, Venice (Plates 87, 88); *Santi Giovanni e Paolo* (1099-1118) on Mount Caelius at Rome (Plate 89); *San Pietro Vecchio*, Brusasco, Piedmont (Plate 90); in the side of the Cathedral of Borgo San Donnino (Plate 114); and in many others.

The bonding of the brick was not utilized generally for decorative pattern work, though in the walls of *Sant' Ambrogio* there appears a crude arrangement of bricks in herringbone fashion (*opus spicatum*) which is rather a whim of the builder than a need of construction. Some time later, however, we find this arrangement used with a definite decorative aim as in the apse of the desecrated priory church of *Santa Maria* at Calvenzano (Plate 91), the side aisle of *San Sepolcro*, Milan (Plate 92),

or in the lunettes of windows at Staffarda and Monza (Plates 93, 94), and quite frequently at Venice.

A most interesting example of a small circular church, after the manner of the enormous *Santo Stefano* at Rome, is *San Lorenzo* of Mantua (Plates 95, 96). Tradition of the XVIII century made it a pagan temple converted to Christian uses by Constantine. It perhaps goes back to the XI century and may have been rebuilt or restored at the beginning of the XII by the famous Countess Matilda (1040-1115). After the parish was transferred to *Sant' Andrea* in the XVI century and the church desecrated, the cite was gradually built over and the church forgotten for centuries, until the Commune of Mantua in 1907, deciding to enlarge the piazza, discovered the hidden church and undertook its restoration as seen at present. It is a very picturesque reminder of the old days as it nestles beneath the great clock tower upon the busy Piazza delle Erbe.

Among the older churches, we note also the Cathedral of Modena, begun in 1099 under the direction of Lanfranco da Modena, and solemnly consecrated in 1184. It is covered on the exterior with stone and is the work of the Campionese mas-

PLATE 97. From Right Aisle toward Choir and Crypt of the Cathedral, Modena.

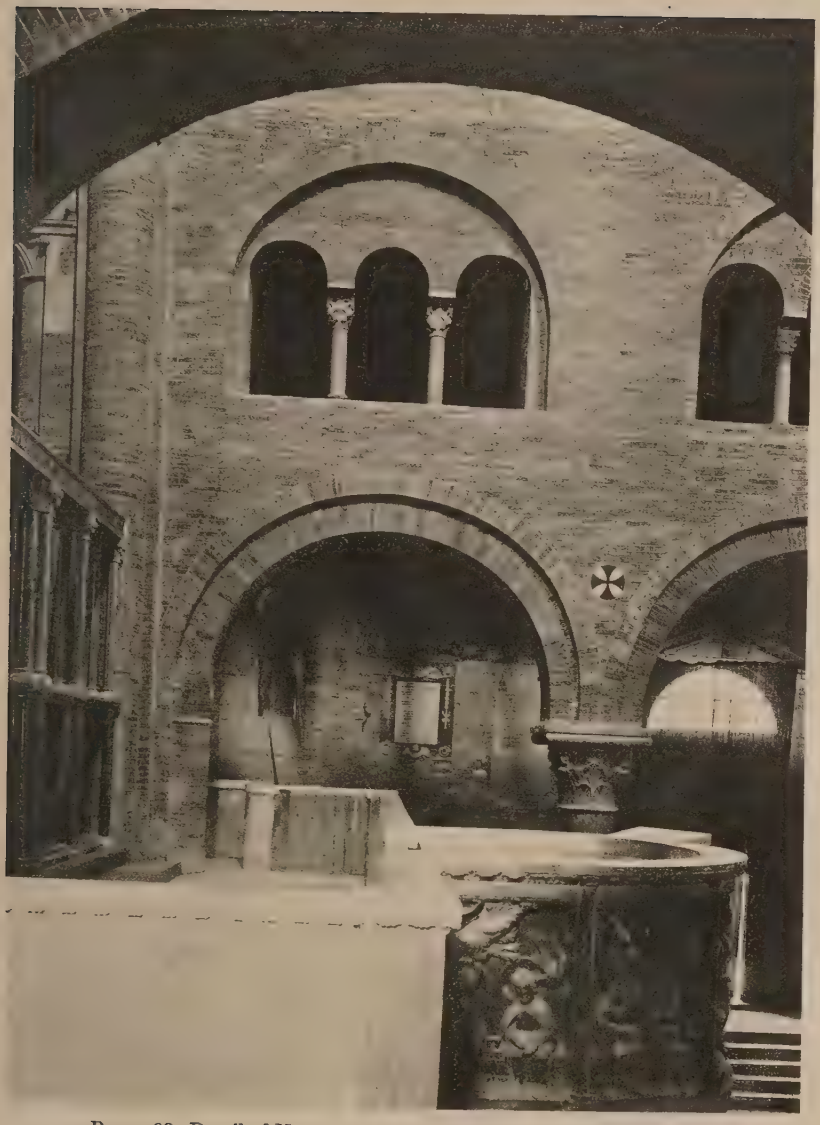


PLATE 98. Detail of Nave and Triforium Arches, Cathedral, Modena.

PLATE 99. Left Aisle of the Cathedral, Modena.

ters who from 1200 to 1322 carried on the work from father to son.* The interior is wholly of brick, restored in 1897. Its harmony with the exterior architecture is truly beautiful. The brickwork of the walls and columns is treated with a feeling of dignity worthy of such a noble interior (Plates 97-100); the arches are executed with a new attention to detail. For example, when the bricks are not long enough for the arch face, they are cleverly toothed (Plate 98) and dovetailed in a way that perfectly meets both constructive and decorative requirements. The cross ribs of the splendid vaulting (Plate 100) consist of single courses of brick chamfered to avoid an otherwise harsh effect.

The neighboring Abbey Church of Nonantola, *San Silvestro* (Plate 101), is another distinguished example of this period. Unlike Modena, the exterior of *San Silvestro* is entirely of brick. Like all such churches of ancient foundation, it has been rebuilt and restored many times; but the striking apse, rebuilt in the XV century and restored in recent years, retains its fine Romanesque feeling of the XII century, although the brick or the brick-

* Lanfranco of Modena is regarded by Porter as ranking "among the foremost architects of all times," and to him must be attributed the great importance in the XII century of the Modena type of ecclesiastical building. It is to him we owe the peculiarly striking canopies or open vestibules before the main portals of Lombard churches, consisting of columns resting upon caryatids in the form of couchant lions. The high standing which Lanfranco had in his day is clearly indicated by the records. On miniatures found in the archives of the Chapter House he is depicted in the robes of his profession as *architector*, or *magister*, authoritatively directing his *operarii*, laborers, and *artifices*, skilled artisans.

The present edifice is a reconstruction of the old cathedral of San Geminiano, the patron saint of the municipality, about whose shrine had grown up the then new Modena, the city we know today. The rebuilding had reached such a point by 1106 that, amid the most solemn rites, at which the great Lanfranco and the illustrious Countess Matilda assisted and in which even Pope Pascal II with a great throng of cardinals and higher clergy took part, the sacred relics of the saint were deposited beneath the altar in the crypt of the new church, which was "dedicated," according to an old document in the archives, "in honor of Mary, the blessed Mother of God." At the time of its solemn consecration in 1184, the main body of the church and the lower part of the campanile were finished. However, much was still to be done, so that with additions and improvements, the entire edifice was not completed until 1319 when, it is recorded, a golden apple was placed on the pinnacle of the campanile, known subsequently as the *Torre Ghirlandina*.

But as in all such monumental edifices of the Middle Ages there was ample field for finishing touches, additions, changes, not always happy or in accord with the original work, running through succeeding centuries. The fact is that such structures seem to have been begun and carried through without any definite preliminary plan or working drawings, except such as might be safely locked in the brain of some such great builder as Lanfranco. Tradition, through building guilds, would carry the work on as occasion permitted. Thus the great cathedrals grew, much as an epic grows, with a nucleus due to some great originating mind, and an outer changing form, sometimes incongruous enough, which in the main organically expressed the original and in time became the finished work we know. See Porter, *Lombard Architecture*, Vol. III, pp. 2-47.

The part the great mason guilds of the Middle Ages played in this work is evident, but Professor Porter's chapter on "Master Builders" in Vol. I of his *Lombard Architecture* should be consulted on this subject. [*Ed.*]

PLATE 100. Brick Vaulting of the Cathedral, Modena.

PLATE 101. Abbey Church of San Silvestro, Nonantola.

work does not have the same excellence as that of the Cathedral interior at Modena.

San Mercuriale, Forlì (Plate 102), belonging to the end of the XII century, has retained very little of its original lines. It is disfigured by baroque additions such as the lateral scrolls and the other crowning lines. On the other hand, the campanile (1180), 75 meters in height [246 feet], has remained almost intact. Its top cornice, unfortunately obscured in shadow, is enriched by a light gallery, with marked aesthetic effect.

At the beginning of the XIII century, we still find a pure Lombard architecture as in *Santa Croce* at Parma; *San Michele* at Cremona (Plates 103-104), founded in 618 by Queen Theodelinda and reconstructed in unusually fine brickwork toward the close of the XII century; and *San Marco* at Jesi (Plate 105), which has a splendid rose window in terra cotta, probably imported from the nearby Chiaravalle.

With the spread of the Franciscan and Dominican religious orders, there began a slight invasion of foreign forms which we first note in the Cistercian Abbey Church of Chiaravalle (Plate 106) near Milan. With the exception of some ogival openings, probably of a later date than the original construction (1172-1221), and the lantern, characteristic of French Cistercian churches, the exterior of this abbey adheres closely to traditional Italian forms, a splendid monument in which the beautiful clear red of the brick is not disturbed by elements in stone, as the columns, pilasters, and cornices are all in the original burned clay. In a section of a window of the lantern, we notice indications of an altogether new decorative movement which was beginning to invade Italian construction (Fig. 47). It is interesting to note the evident influence of this noble lantern on Pecorari when, a century or more later, he built the strikingly graceful brick tower of *San Gottardo*, once the chapel of the Visconti, and now part of the XVIII century Royal Palace of Milan (Plates 107, 108).

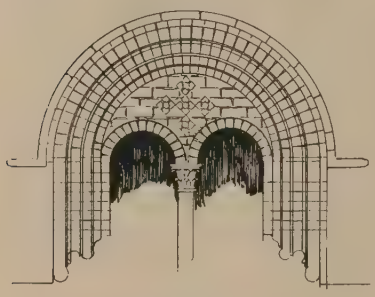


FIG. 47. Detail of Tower Window, Chiaravalle.

PLATE 102. Tower of San Mercuriali, Forli.

PLATE 103. San Michele, Cremona.

Courtesy of Prof. Porter and Yale University Press

PLATE 104. Apse of San Michele, Cremona.

PLATE 105. San Marco, Jesi.

PLATE 106. Abbey Church of Chiaravalle Milanese.

PLATE 108. Tower of San Gottardo, Milan.

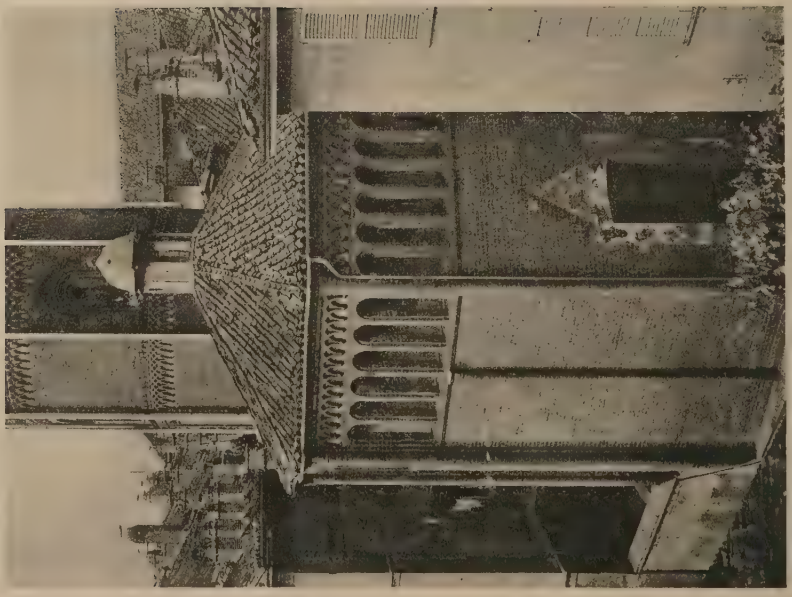


PLATE 107. Apse of San Gottardo, Milan.

PLATE 109. Cloister of Chiaravalle Milanese.

PLATE 110. Detail in Portico of Cloister, Chiaravalle Milanese.

PLATE 111. Detail of Tabernacle in Cloister Wall, Chiaravalle Milanese.

PLATE 112. Hospital of St. Anthony, Buttigliera Alta, Piedmont.

Courtesy of Prof. Porter and Yale University Press

PLATE 113. Abbey Church of Chiaravalle della Colomba.

The Cloister of Chiaravalle (Plates 109, 110) very clearly suggests an idea of the beauty of the cornices, enriched as they are by a rope decoration above a graceful interplay of small pendent arches. Here new expression in brick decoration may be found in the band above this arcading in which small square bricks are set corner to corner, seen also in the beautiful chapel (Plate 111) where these same small square bricks are set with beautiful decorative effect in the form of crosses.

Equally worthy of note is the splendid Abbey Church of Chiaravalle della Colomba, *Santa Maria*, somewhat earlier in the XII century than the Milanese example. The narthex belongs to the end of the century. The modern restoration has left the original lines substantially intact (Plate 113).

The pointed arch entered but gradually into Lombard architecture. Up to this time it had found its way only into some local constructions not far from the French frontier, as at Buttigliera where it existed as far back as the XII century (Plate 112). In the magnificent Cathedral of Borgo San Donnino, begun in 1207, pointed arches between the buttresses support the projecting masonry of the upper story along which runs

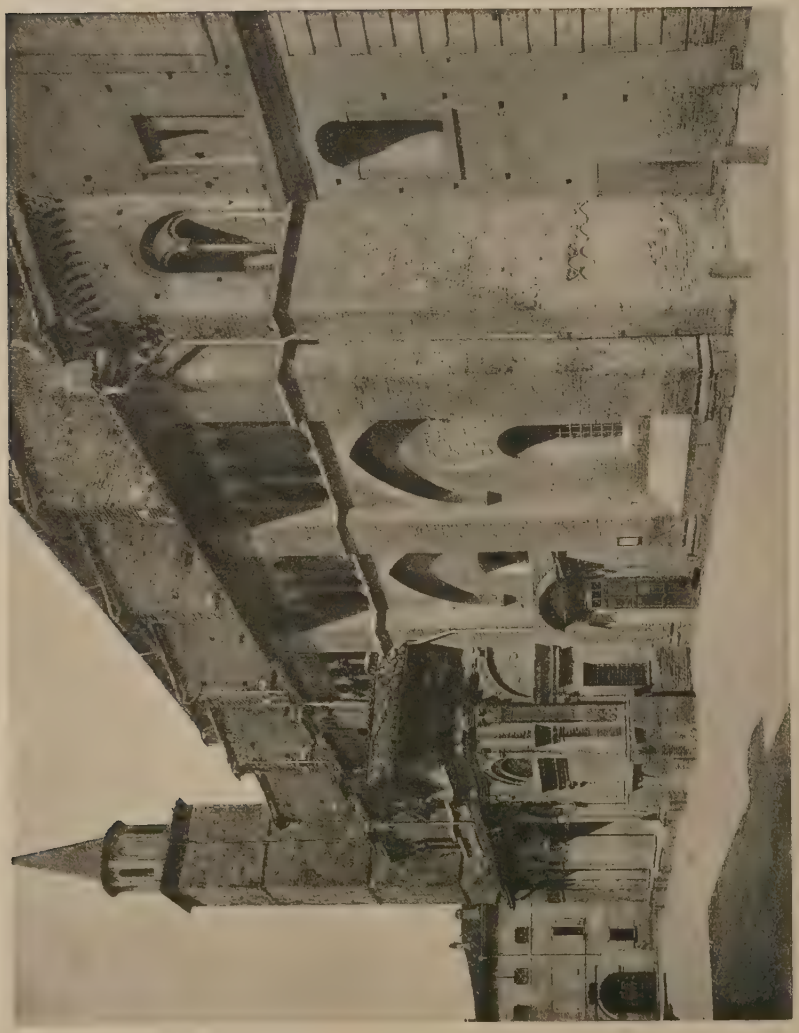


PLATE 114. South Flank of Cathedral, Borgo San Donnino.

an open arcaded gallery (Plate 114). We find the ogival also in Central Italy, about the middle of the XIII century, in the campanile of the Cathedral at San Severino (Plate 115). In fact, these architectural forms, varying slightly with the location, may be found in Italian churches throughout the entire XIII century.

At Cremona, the Cathedral (Plate 116), constructed in 1109, was rebuilt on a grander scale in 1124 of beautiful yellowish red brick, excepting the stone façade, with later additions in the XIII and XIV centuries. To this later period belong the very beautiful rose windows of the transepts, in brick and terra cotta of local manufacture (Plates 117, 118). At Crema, the Cathedral (Plate 119), built of a yellowish orange brick, has an unusual profusion of terra cotta around the various openings. In the different details here given (Figs. 48, 49), we may see altogether new mouldings, which pave the way for the development of the Lombard - Gothic style.

At Bologna, we have a most remarkable example of brick decoration in the group of churches known generally under the name of *Santo Stefano* (Fig. 50*c*). This group is composed of seven churches, the three most important of which are seen in Plate 121. At the left, is the Basilica of *Santi Pietro e Paolo*, the exterior restored in 1880-85 after the

PLATE 115. The Old Cathedral, San Severino.

PLATE 116. The Torrazzo and Baptistery of the Cathedral, Cremona.

PLATE 117. North Transept of the Cathedral, Cremona.

PLATE 118. South Transept of the Cathedral, Cremona.

PLATE 119. Cathedral, Crema.

medieval type, the portal of which is worthy of study (Plate 124). In the center, is the octagonal *San Sepolcro;* and on the right, the simplest in its external decoration, is the *Chiesa del Crocifisso* with its XII century vaulted brick pulpit on the left corner. The cornices of these three churches are worthy of note as showing varied treatments of the same simple motives (Fig. 50*b*).

We enter first the Church of the Crucifix. The presbytery is disfigured by constructions of 1637 but the nave has preserved its original character (Plate 125). The brick,

FIG. 49. Detail of Gable Arcade, Crema.

FIG. 48. Detail of Facade Window, Crema.

of a light-red color, are of the large size 8x32x16 cm. [3.2x12.6x6.3 in.] with mortar joints from 1.5 to 2 cm. [0.6 to 0.8 in.]. On the wall left of the choir may be seen a band of herringbone pattern with a wider one above, where there is a resumption of the motive found on the exterior of the polygonal cupola of *San Sepolcro* (Plate 121), an edifice which is probably an XI century reconstruction of an ancient baptistery with a characteristic base. The exterior wall of the cupola is also characteristic; its surface is decorated with simple patterns of red and yellow

JARBAS BARBOSA

Plate 120

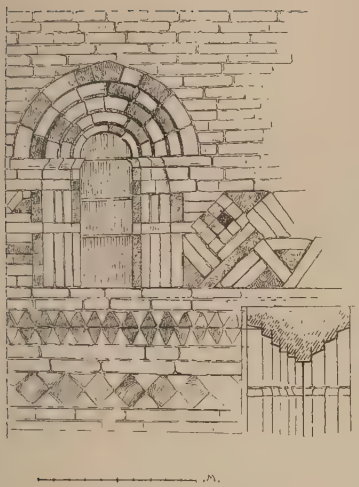
San Sepolcro and Court of Pilate, St. Stephen's, Bologna

The Colonnade or Atrio di Pilato, *as may be seen in Fig. 50c, is a quadrangle about which are grouped the seven churches and chapels which go under the name of St. Stephen's. It seems singular that none of these churches bear St. Stephen's name. It is probable, however, that St. Petronius, who suffered martyrdom in 430, the patron saint of Bologna, originally founded a church here and dedicated it to the first martyr, a name that clung to the district and was applied to all the churches that afterwards came to be grouped at this center.*

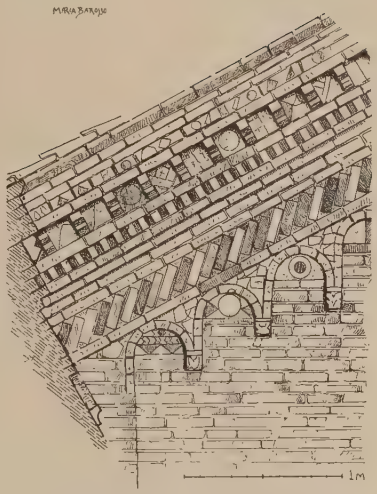
On the west side of the Court is St. Sepulcre; on the east, is St. Trinity, while on each of the long sides is an arcade of five round arches under which open various chapels. In the center of the court is an ancient baptismal font bearing the name of the Lombard King Luitprand (712-744). A section of the window in one of the octagonal sides of St. Sepulcre, glimpsed under the right arcade, is given in Fig. 50a.

The whole group of St. Stephen's represents various early foundations and the growth of many centuries, but the Court and St. Sepulcre, of which the aquarelle gives the eastern elevation, belong to the XII century when the brickwork of the medieval period marked its highest point in matters of both construction and ornamental treatment.

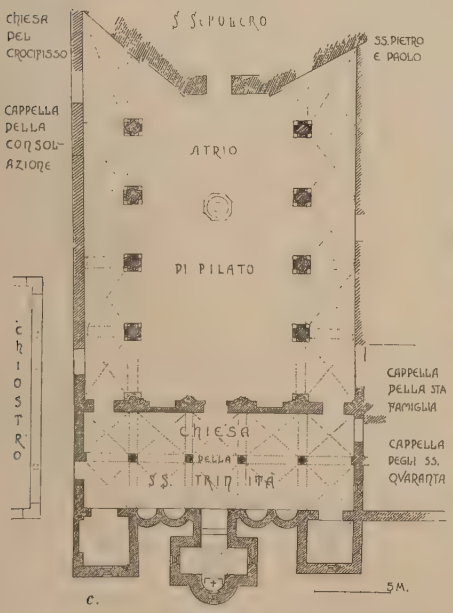
To the same period also were doubtless due the names of Pilate's Court and St. Sepulcre, as stations in that sacred pageant of the Cross which the Crusades make very popular at that time throughout western Christendom.



a. Window in San Sepolcro.



b. Cornice Detail, SS. Pietro e Giovanni.



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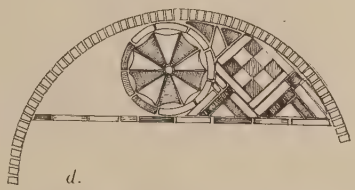

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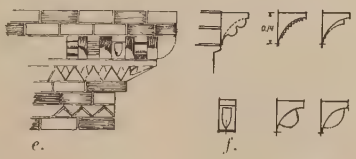
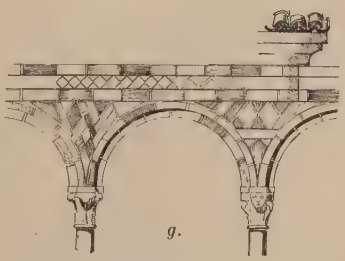


e. *f.*



g.

Fig. 50. Plans and Details of St. Stephen's, Bologna.

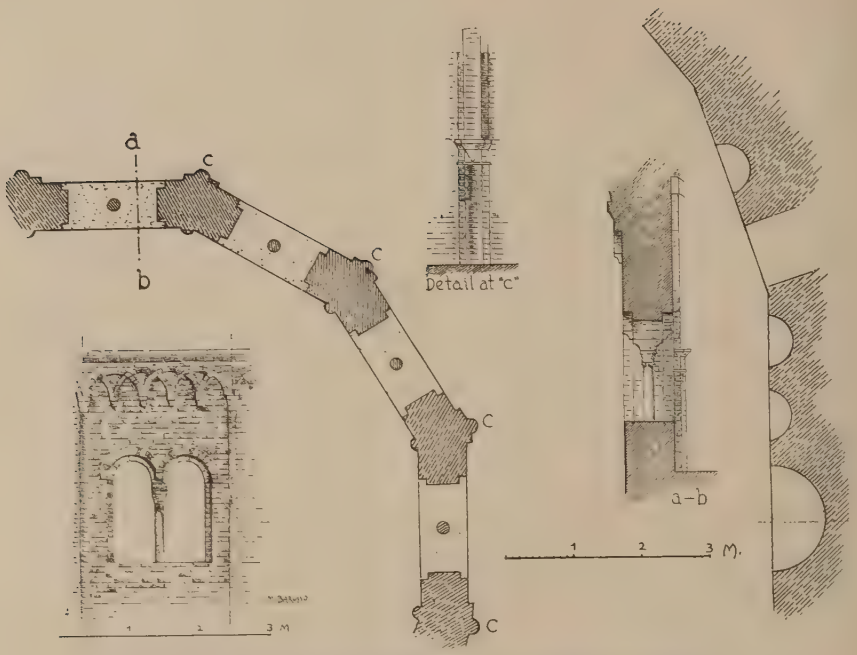


Fig. 51. Gallery Plan of San Sepolcro, Inner Pilaster and Section.

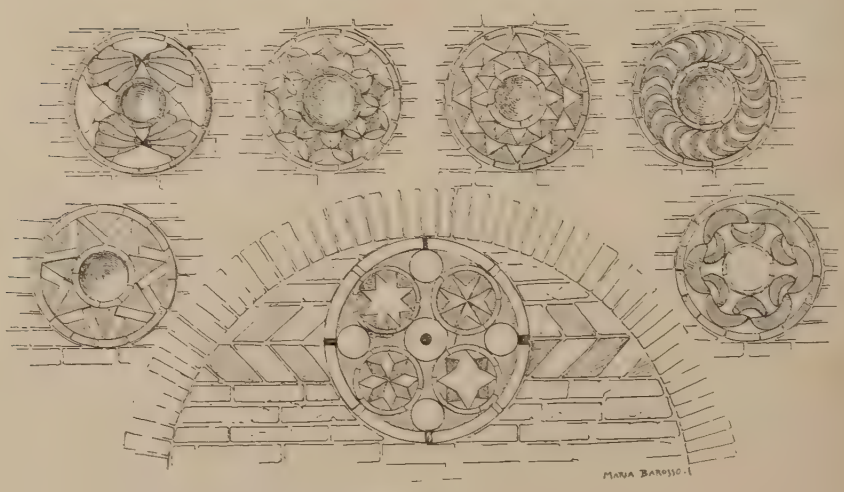


Fig. 52. Typanum in San Sepolcro, and Rosettes in Portico of Pilate.

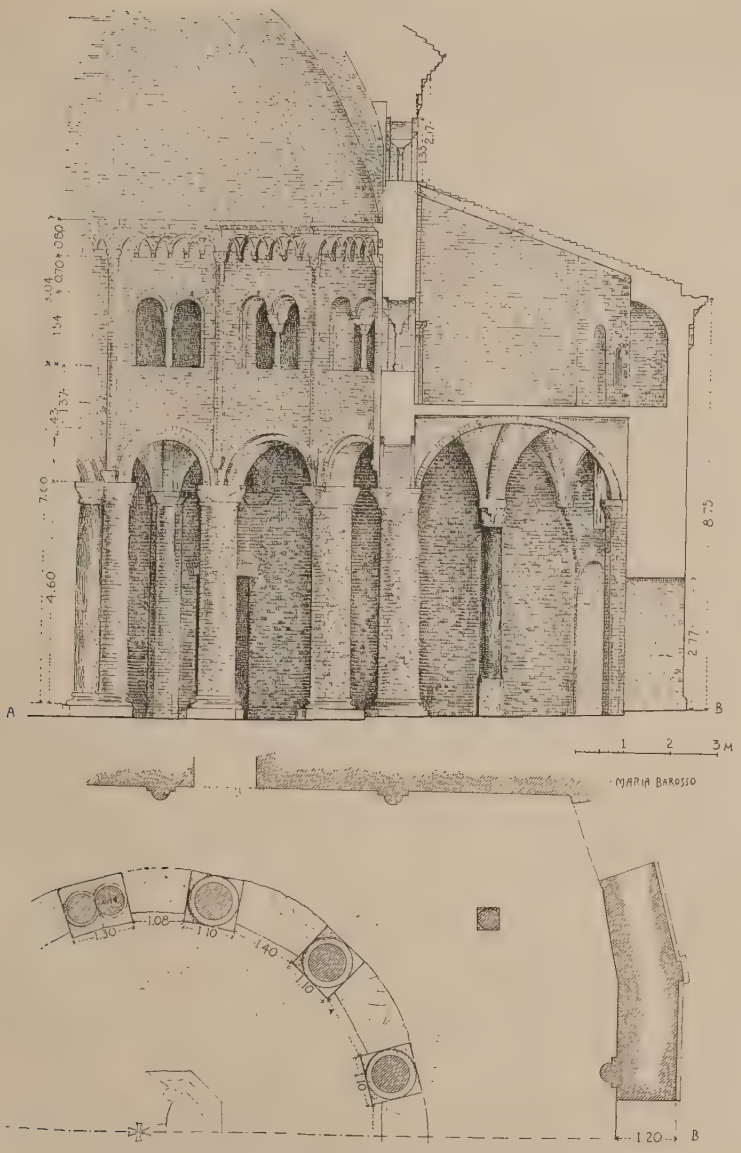


Fig. 53. Detail of Interior and Plan of San Sepolcro, Bologna.

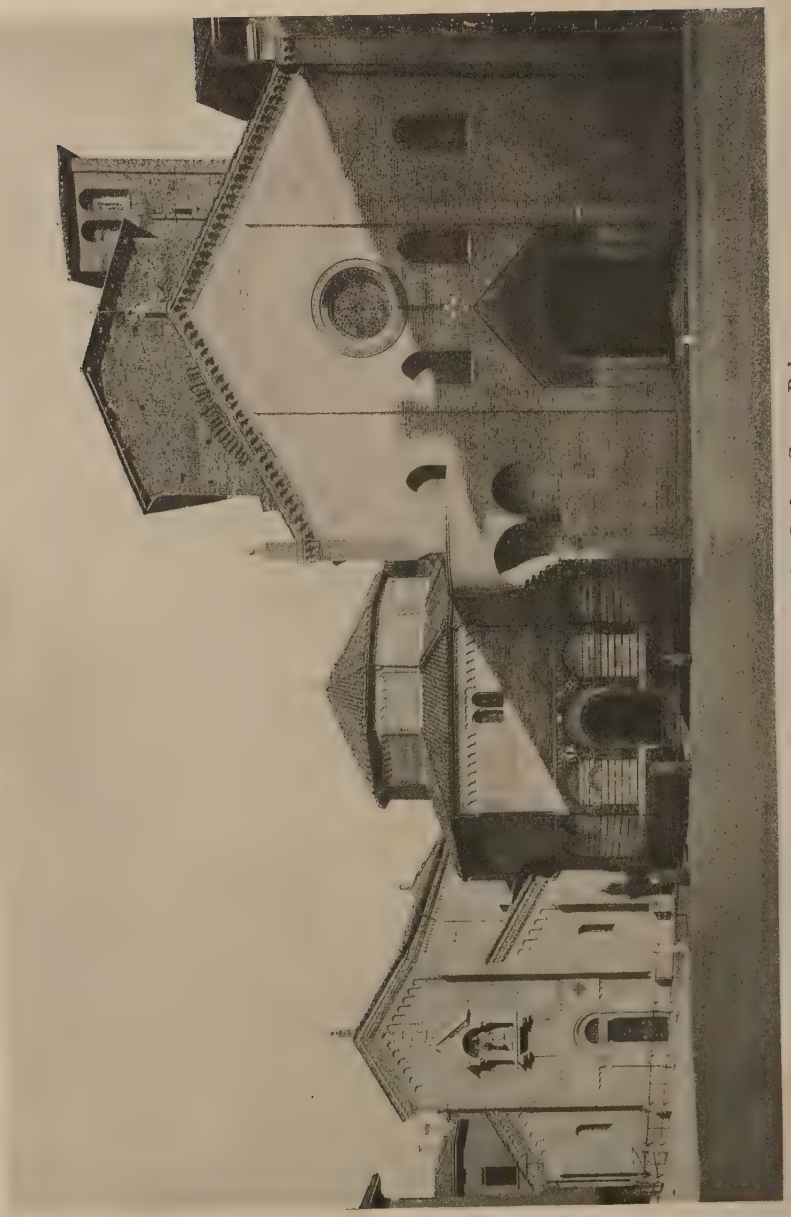


PLATE 121. Three Churches in the San Stefano Group, Bologna.

Plate 122

Detail of Exterior Wall, St. Sepulcre, Bologna

Very rich, perhaps among the most beautiful characteristic examples of polychrome wall decoration extant, is the exterior of St. Sepulcre on the sides facing both the piazza and the Court of Pilate. Our illustration gives the most elaborately decorated side of the octagon which is toward the Court. Delicate brick pilasters, terminating in the form of engaged columns with marble capitals of the Corinthian order, set off the angles of the octagon and enclose a panel of the most elaborate and varied pattern.

A cornice of simple projecting brick courses above a row of brackets, separated by triangular brick and marble insets, surmounts a row of round interlacing pendent arches, on the line of the pilaster capitals. The field of the plain brickwork below is crossed horizontally by numerous decorative bands, made up of rosettes, asymmetrically placed, diamond-set squares of brick, herringbone patterns, and trapezoids, for the most part of cut brick, varied here and there by small insets of white marble and green porphyry. A simple marble band crosses the base half way up to the imposts of the round arched portal.

The spacing of the horizontal bands shows pleasing proportions, and the whole effect which is that of a regular irregularity is very striking. The varied tones of the red brick, the white and green of the insets, and the natural colored jointings make an extremely beautiful polychrome. It shows a strong Byzantine influence in the making of a mosaic out of brick elements.

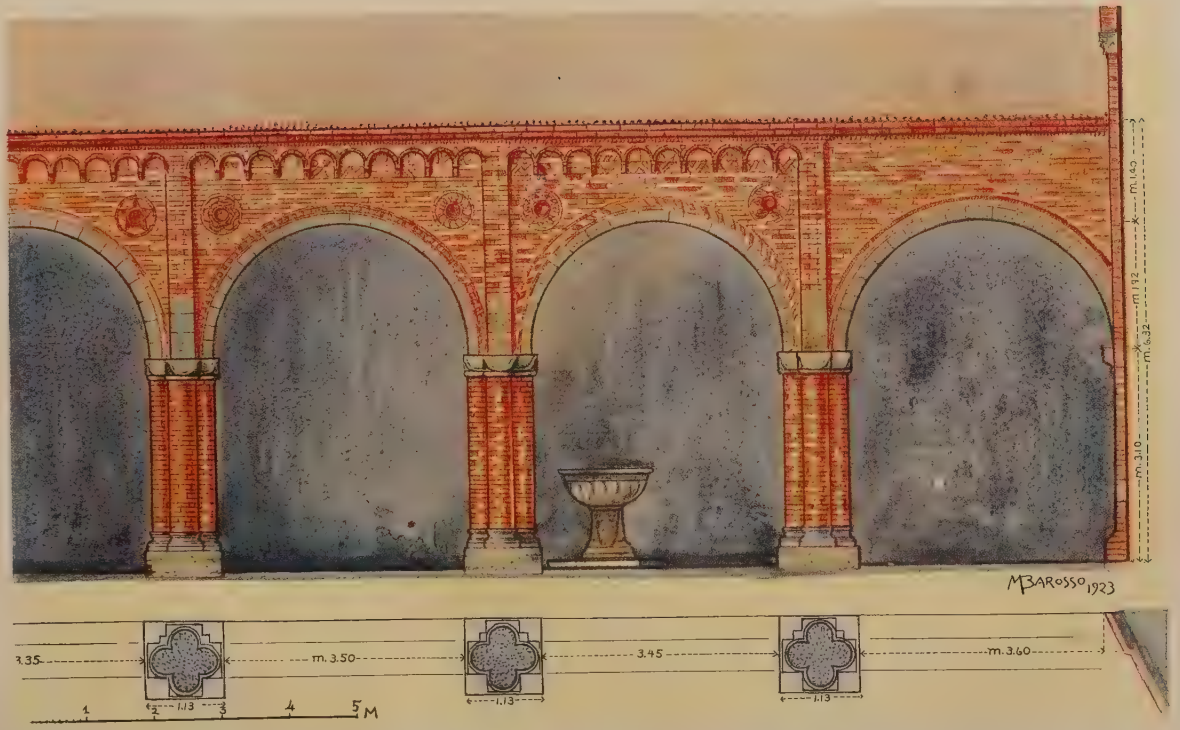

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Plate 123

Court of Pilate, South Elevation, St. Stephen's, Bologna

The brick piers in these beautiful arcades consist of four engaged columns with small pilasters at the points of intersection under the arcade. This grouping of columns, proper to the Romanesque period, had its origin in early Imperial work, and enjoyed wide application in subsequent Gothic construction. The columns, with a total height of a little over 9 feet, including the stone attic bases and square capitals, support arches of different spans. The voussoirs are of stone with a decorative brick treatment on the extrados.

Above the capitals of the outer columns rise pilasters of stone and brick which divide the wall above the arches into decorative fields and support the cornice with its small pendent arches.

In the spandrels are a series of beautiful rosettes (Fig. 52), approximately two feet in diameter, set even with the wall surface, and consisting of various geometrical patterns surrounding central concave majolica discs of iridescent colors. The cornice is typical, consisting of simple projecting brick courses with a saw-tooth course above the line of arches on brackets, which show in the background a most varied decorative treatment.

As in St. Sepulcre, the arches of the irregular cross vaultings under the arcade are supported upon the outer pillars and pendent capitals of stone which project from the inner wall.

bricks. Likewise the tympana of the arches in the first story are decorated with pretty rosettes, the designs of which are accentuated by the contrast of the brick colors (Figs. 50*d*, 52).

PLATE 124. Main Portal of Santi Pietro e Paolo, Bologna.

A pleasant surprise, however, is afforded by the decoration of the opposite side of this church in the socalled *Atrio di Pilato* (Court of Pilate, Plates 120, 123). Here we find an unbridled succession of the strangest combinations, of motives intermingled with the most pleasing effects. From top to bottom of the wall, we see numbers of rosettes worked out in great detail. At the top there is a band made up of small crosses, in which the arms are common to two consecutive crosses, producing a double decorative motive as the elements of the crosses are cut out of yellow brick while the background is of red brick. Intermingled with all are six-pointed stars which produce a beautiful decorative effect. Further down there appears herringbone designs interspersed with star-shaped rosettes and checkerboard motives among which, here and there, pieces of limestone are substituted for the yellow brick and porphyry fragments for the red brick. There are also small square bricks set corner to corner as in the Abbey Church of Chiaravalle.

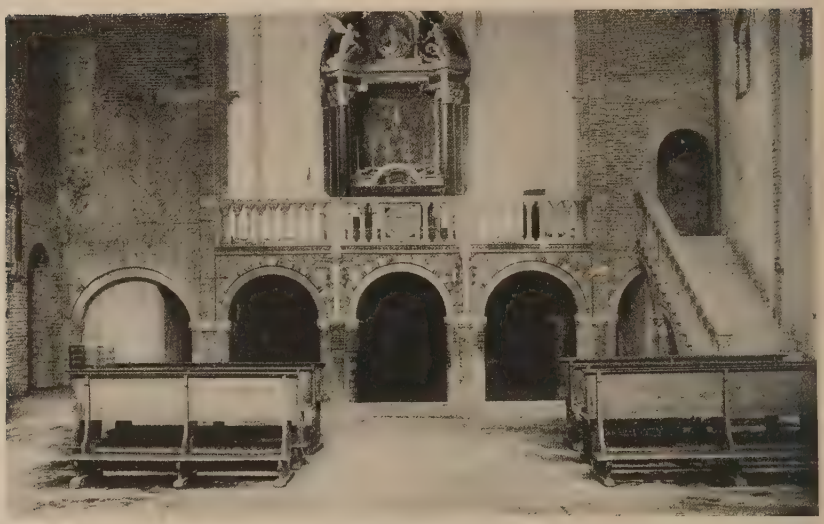

PLATE 125. Interior of the Church of the Crucifix, Bologna.

PLATE 126. Interior of San Sepolcro.

MARIA BARBOSA

Plate 127

Interior of St. Sepulcre, Bologna

This church was doubtless originally a baptistery, such as other early Christian baptisteries, many of which are found from the v century on, similar to those at Rome, Milan, and Ravenna. In its present form, it belongs to the xii century and derives its name from the monumental marble altar with a crypt, said to be a reproduction of the Holy Sepulchre at Jerusalem, a sacred object that held a central place in the hearts of the faithful, especially during the early days of the Crusades.

It is venerated as the tomb of St. Petronius, martyred in 430, the patron saint of Bologna. The plan (Figs. 51, 53) is that of two concentric octagons, divided by eight columns, four of which are paired with columns of marble, supporting round arched openings into an ambulatory which occupies the outer octagon on the ground floor. The ambulatory is covered by irregular cross vaultings supported on round arches, springing from the central piers on the inner side and from pendent capitals on the outer wall. Above is the matroneo, *or women's gallery, with graceful two-light, arched openings toward the interior.*

As the polygonal enclosing walls are irregular, many of the arches in the lower ambulatory are awry. The central columns or round piers are a little over 13 feet in height, including the square capitals and attic bases. The brick columns paired with those of gray marble are of smaller diameter, resulting in narrower intercolumniation and arch span. The irregularity and asymmetry of line and form afford an added charm.

The cupola is not spherical but simply formed by the sides of the octagon. Aside from the beauty of the brickwork in its soft varied tones of light red, the decoration is very sober, and is almost entirely confined to the cornice of small arches under the impost line of the cupola. But nothing could be more impressive in the dim religious light that filters down from the cupola, than the simplicity and dignity of line and color in this little sanctuary dedicated to solemn thought.

MARIA BAROSSO

Plate 128

Chapel of Most Holy Trinity, St. Stephen's, Bologna

The east end of Pilate's Court is occupied by the Chapel of Most Holy Trinity. The front part of the church, where the faithful gathered, is in the form of a wide hall 20 by 60 feet, divided by four antique marble columns, taken from various earlier edifices, with their elaborate capitals, upon which rest the cross vaultings and arches supported on the side and back walls by pilasters and corbels. In the center of the wall directly before us is seen a high arched opening which leads to the chapel called the Reliquary, a veritable Sanctum Sanctorum. *This Reliquary is in the form of a cross. The head, which contains the altar, and the two arms are cross vaulted and take on apsidal form. At the right and left of the entrance are seen two great semicircular niches 16 feet high and over 4 feet wide. Beyond on either side are entrances to chapels.*

This series of round arched openings and niches with their deep shadows and the chapels, where the light filters through narrow windows, creates an austere and mystical atmosphere, enhanced by the frescoes of sacred scenes that once entirely covered the walls, in place of which now appears the beautiful though unadorned brickwork, due to the recent scholarly and artistic restorations of Collamarini.

The chapel of Most Holy Trinity offers a very interesting example of brick construction of the medieval period at its highest development, in which various classical and Romanesque elements are fused into a harmonious and severe ensemble.

The combinations in the portico are curious (Plate 123). The rosettes originally had bowl-like ornaments in the center, one of which, of a violet-red color, has been recently discovered. The motives are most varied, as may be seen in our illustrations (Fig. 52). The bases of the best-preserved columns are also in brick from 6 to 6.5 cm. [2.4-2.6 in] in. thickness, cut with the hammer. The interior of San Sepolcro (Plates 126, 127, Figs. 51, 53) in red brick with its mellowed patina of age inspires a sentiment of wrapt mysticism through the austerity of line and color.

At the opposite end of the Court of Pilate from *San Sepolcro* is *Santissima Trinità* with chapel beyond, (Plates 128, 129, 130) restored in beautiful creamy yellow brickwork by Edoardo Collamarini, Professor in the Royal Academy of Fine Arts at Bologna. On the interior of Sts. Peter and Paul (Plate 131) a rich varied red brick has been used in piers and walls with a very pleasing effect.

The great Cloister, adjoining the Court of Pilate and in the rear of the Church of the Crucifix, is impressive in the harmony of its colors which age has softened into a misty gold (Plate 132). Its lower story goes back to the IX century while the upper belongs to the early years of the XIII. Here also we find the most varied combinations in the spandrels of the upper arches. The latter are constructed of curved brick which in length are the full width of the intrados, or 40 cm. [15.8 in.]; they are 5 cm. [1.9 in.] thick, recessed 6 cm. [2.4 in.] from both the interior and exterior faces of the extrados brick, which are also 5 cm. thick. There are two cornices, the profiles of which are given in Fig. 50, *e* and *g*. In Fig. 50*e*, under the line of the brackets is seen an inclined band of bricks cut in a geometrical design. The frieze consists of three brick courses, each 6 cm. [2.4 in.] wide, the middle one of which is carved in two prevailing motives—a line of small diagonally set squares and a triangular fret (Fig. 50*g*). Then comes the row of brackets above, each cut on a single brick in the most varied forms, of which we give in outline the simplest and most characteristic (Fig. 50*f*).

The Basilica of *Sant'Andrea* at Vercelli (Plates 133, 134), built between 1219 and 1224, should also be included in our review

PLATE 129. Entrance to Holy Trinity, St. Stephen's, Bologna.

PLATE 130. Sanctuary of Holy Trinity, St. Stephen's, Bologna.

PLATE 131. Interior of Sts. Peter and Paul, St. Stephen's, Bologna.

PLATE 132. Cloister of St. Stephen's, Bologna.

as one of the finest brick churches of this time, very remarkable both for the beauty of its lines and for its skillful construction. Though erected by canons from Paris, Romanesque lines are preserved on the exterior, but the interior is modeled after the early Gothic of Northern France.

During this period, civil architecture was fully established in the form of towers, public palaces, municipal buildings, and city halls. At Treviso, we still find very pure forms in the *Palazzo dei Trecento*, built in 1184 (Plate 135) but recently restored by Giulio Nivi. Much in the same spirit is the restoration of the *Palazzo Provinciale*, or Prefecture, to the left, done by Camillo Boito.

At Cremona, the *Palazzo Comunale* and the *Torrazzo* are very remarkable for their profusion of terra cotta of exquisite workmanship. The former (Plate 136), erected between 1206 and 1245, possesses altogether new decorative elements; the pointed arch has already been introduced in the portico. The tower belongs to an earlier period, while the tribune on the center pier belongs to the XVI century. The *Torrazzo* (Plate 116), erected between 1250 and 1267 has two- and four-light openings beautifully framed in pointed arches. To the right is seen the large octagonal brick Baptistery belonging to the XII century.

At Piacenza, the *Palazzo del Comune* (Plate 137), begun in 1281, which stands out prominently among other buildings of the town, has three- and four-light openings of unparalleled beauty which are adorned with friezes of the greatest variety, done with the hammer. The east end (Plate 139) is gabled and has above the two three-light openings a graceful rose window in terra cotta. The west end (Plate 138) presents a still finer effect in a very beautiful opening of many lights with slender binate columns, the whole finely framed above two three-light openings. At Monza, the *Palazzo Arengario*, or Town Hall (Plate 140), was erected in 1293 with another tower than the present one. Herringbone decoration is seen in some of the window spandrels.

At Fano the *Palazzo della Ragione*, or Court of Justice (Plate 141), preserves very pure lines. The spandrels show characteristic arrangements altogether new and of great variety. The Cloister of *San Niccolò* at Tolentino (Plate 153), with its square,

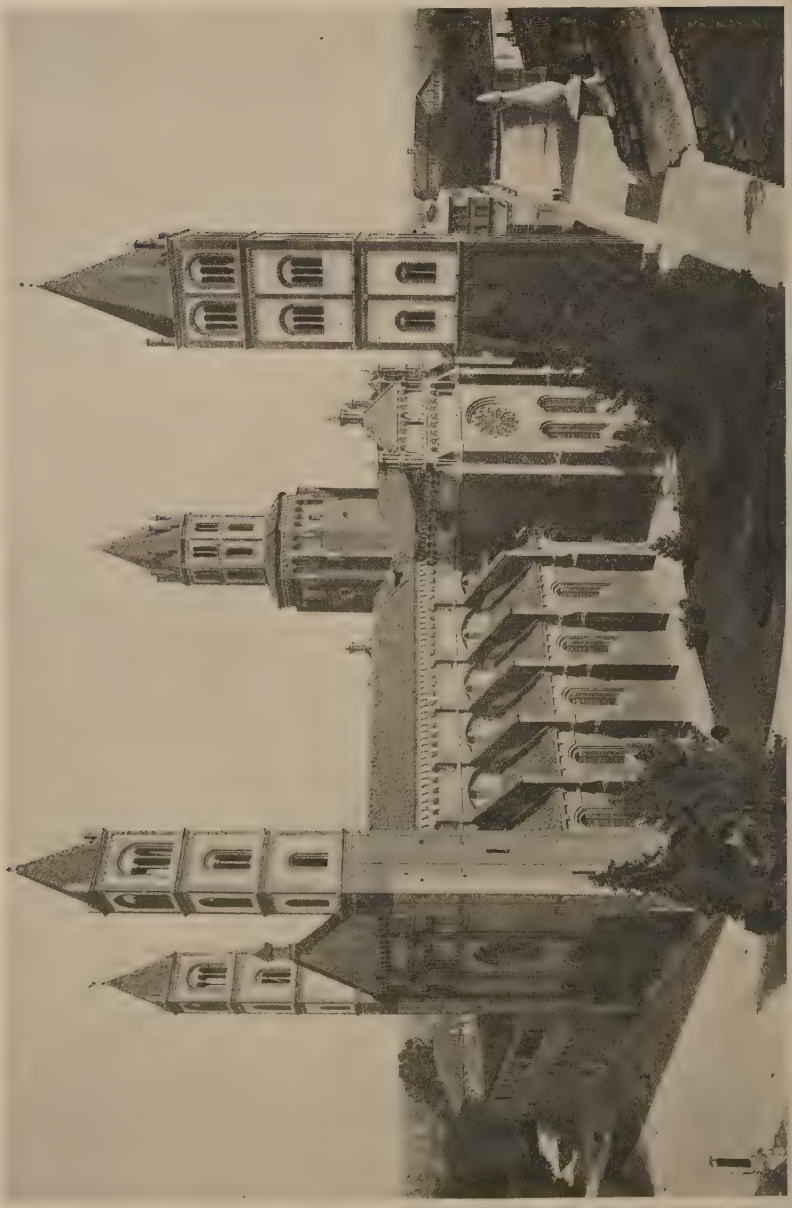

PLATE 133. Sant' Andrea, Vercelli, Piedmont.

PLATE 134. Apse of Sant' Andrea, Vercelli.

PLATE 135. Palace of the Trecento (right); Provincial Palace and Tower of the Commune (left).

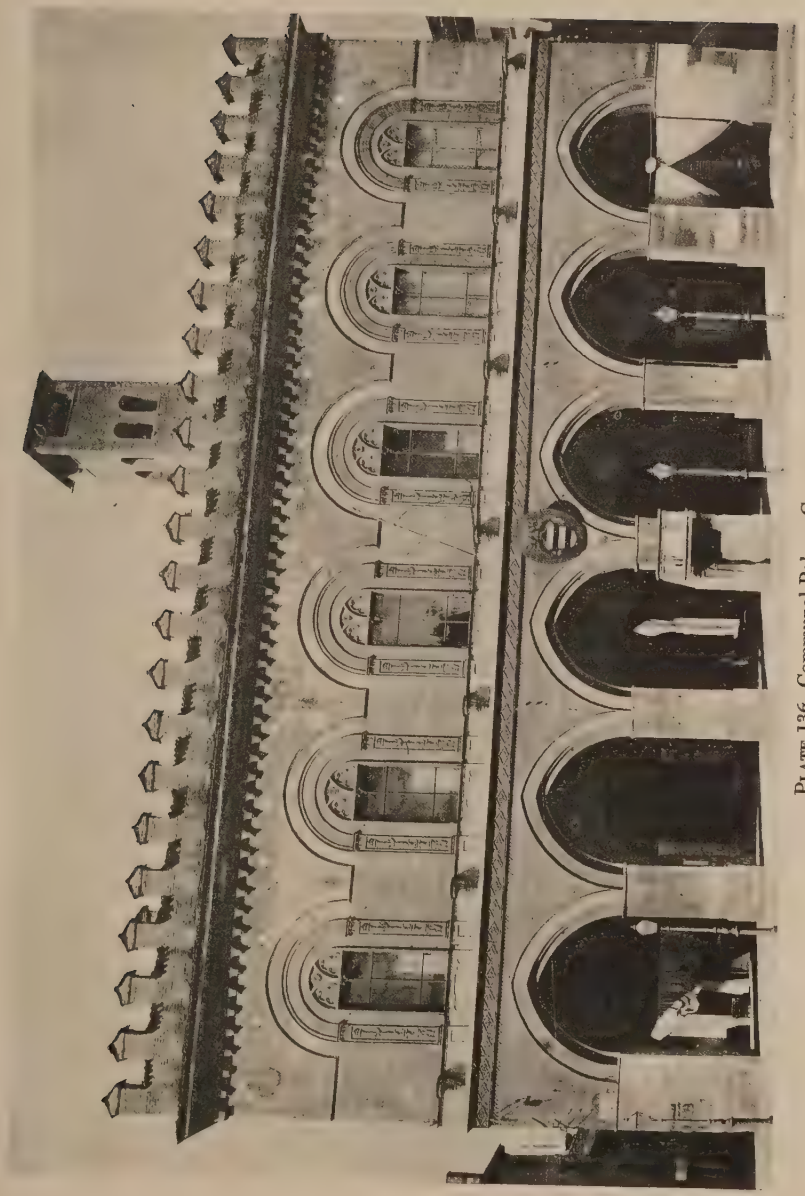

PLATE 136. Communal Palace, Cremona.

PLATE 137. The Communal Palace, Piacenza.

PLATE 138. West End of Communal Palace, Piacenza.

PLATE 139. East End of Communal Palace, Piacenza.

PLATE 140. Palace of the Commune, or Arengario, Monza.

PLATE 141 Palace of Justice, now a Theatre, Fano.

PLATE 142 Campanile of Cathedral, Gaete.

round, and grouped brick columns, also reveals the purest lines.

A peculiar form of construction of the period were immense brick towers, built originally for defense and meant to show the power and wealth of the builder. The *Torre degli Anguillara* in the Trastevere at Rome (Plate 143), built by a member of the powerful Orsini family, is characteristic of the times, as is the tower at Ravenna built by the commune (Plate 144). At Bologna the towers of the *Garisendi* and the *Asinelli*, erected at the beginning of the XII century, survive out of the 180 which are said to have belonged to the city's nobility at that time. The first which remained unfinished on account of settlement in the ground is only 47.5 meters [155.8 ft.] in height, the second, seen in Plate 145, rises 97.6 meters [320.2 ft.] with a breadth of 12 meters [39.4 ft.] Such characteristic towers of the period are found everywhere. At Rome the *Torre de' Capocci* (Plate 146), at one time in the possession of Vanozza de' Catanei, mother of Lucretia and Caesar Borgia; the *Torre delle Milizie*, or *di Nerone* because that wicked emperor was in popular tradition supposed to have watched from its summit the burning of Rome (Plate 147); and the *Torre de' Conti* (Plate 148), built during the pontificate of Innocent III (1198-1216), a member of the Conti family, were constructed in those troublous social and political times of the XII and XIII centuries.

We also see at this epoch the beginnings of fortress construction, well-preserved examples of which may be found in the XIII century, as the *Rocca Sanvitale*, at Fontanellato near Parma, and the *Rocca di Caterina Sforza* at Forlì (Plates 149, 150). The *Castello di Ostia*, near Ostia, and the *Castello delle Quattro Torri*, near Siena (Plates 151, 152), although of later construction, illustrate the same general type. As a part of the necessary civic protection of the day were the fine XIV century city gates of Siena, of which the *Porta Romana* is a striking example (Plate 154).

Southern Italy is poorly represented in brick architecture; clay is scarce and stone is very common. But a good idea of the forms in this region, varying between Moorish and the Romanesque influences, may be had at Gaeta in the campanile of the Cathedral which rises in very harmonious proportions (Plate 142).

PLATE 143. Torre Anguillara, Rome. Restored.

PLATE 144. Communal Tower of Ravenna.

PLATE 145. Tower of Asinelli, Bologna

PLATE 146. Tower of the Cappocci, Rome

PLATE 147. Torre delle Milizie, or Nerone, Rome.

PLATE 148. Tor de' Conti

PLATE 149. Rocca Sanvitale, Fontanellato.

PLATE 150. Rocca di Caterina Sforza, Forlì.

PLATE 151. The Castle near Ostia.

PLATE 152. Castle of the Four Towers near Siena.

PLATE 153. Corner in Civic Museum, once Cloister of San Niccolò, Tolentino.

PLATE 154. Porta Romana, Siena.

PLATE 155. Windows in the Borgheresi Palace, San Gimignano.

THE GOTHIC PERIOD

During this period,[1] there was in Italy an architecture which, though adopting a few elements from the new style, remained on the whole purely Italian. The pointed arch, which indeed is often associated with the semicircular arch, usually has the centers of its two curves at the ends of the span; at times, when the arch is less slender, the two centers divide the span into three parts; while, in very pointed arches, the centers fall outside the span altogether. The meeting of the bricks at the apex of the arch resulted in an imperfect keying, if it was desired to keep the joints normal to the line of the intrados. But this difficulty was overcome by using a stone key block; or, as in Tuscany (Plates 155, 156), the exact keying of the brick might be secured by making the joints converge toward a single center.

Flying buttresses grew more slender and presented a less robust appearance than in the preceding period. Decorative

1. G. GIOVANNONI: *Gli stili architettonici.* BOITO: *L'architettura nel Medio Evo in Italia.* VERDIER ET CATTOIS: *Architecture civile et domestique en Moyen Age.*

cornices, though often approaching classical outlines, are comparatively small, show little projection, and are often supported by a series of small arches, as in the *Mercanzia* at Bologna (Plate 157). These small arches in gabled fronts are frequently set out of plumb, or normal to the slope of the roof as, for example, in the façade of *San Francesco* at Bologna, where we also see a return to decoration in enameled bowl-like ornaments forming a line below the small crowning arches (Plate 158).

On interiors, brick piers upon which the groin arches are gathered often have mouldings executed on the brick with very delicate hammer work, made possible by the excellent quality of the brick. These mouldings are sometimes rather complex, especially when the brick are laid in regular zones in connection with stone, the moulding of which they follow with great precision. The groins of the vaults have the brick either simply chamfered or cut in semi-circular or more elaborate forms, as shown in Fig. 54.

The architecture of this period still retains local character, so much so that writers on the subject like Giovannoni find it necessary to make distinction among various Gothic styles, as Lombard, Venetian, Tuscan, Sienese, Lucchese, etc. It is interesting to note that in order to manufacture terra cotta for the decoration of brick buildings, generally of a little lighter tone than the brick, special equipment was now added to almost all kilns and many excellent artists devoted themselves to its manufacture.

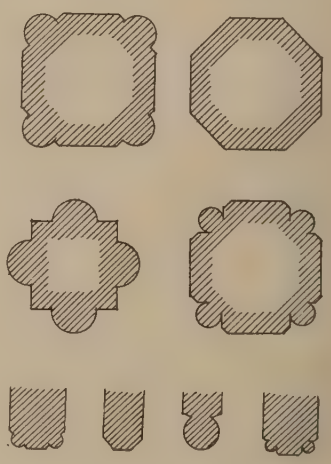

Fig. 54. Types of Piers and Groin Ribs.

At Bologna, the Church of *San Francesco*, built between 1236 and 1263, belongs to this period, especially because of its characteristic apse (Plate 159). The lofty bell tower and the tombs of two great jurists at the rear, of which only that of Messer Accursio is seen in the illustration, are more than a century and half later. The pointed tops of the tombs are in enameled green brick. The vestibule

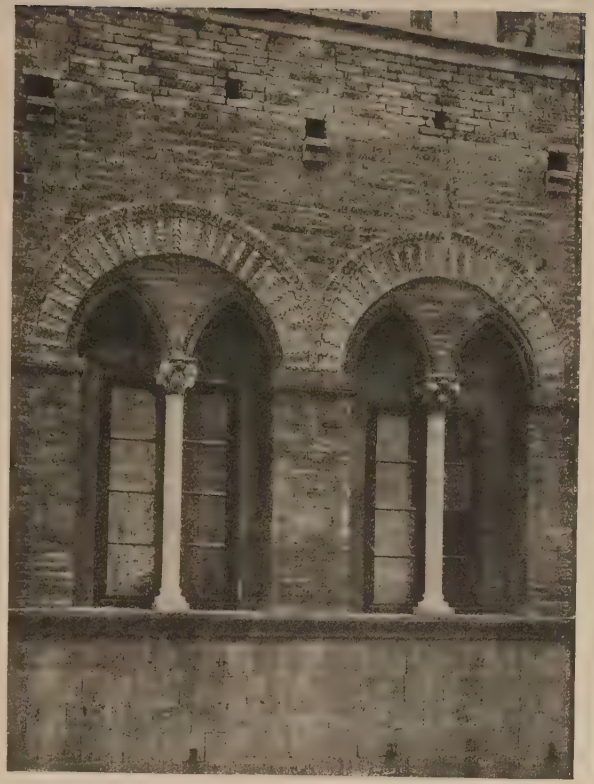

PLATE 156. Windows in Tinacci Palace, San Gimignano.

PLATE 157. Mercanzia or Chamber of Commerce, Bologna.

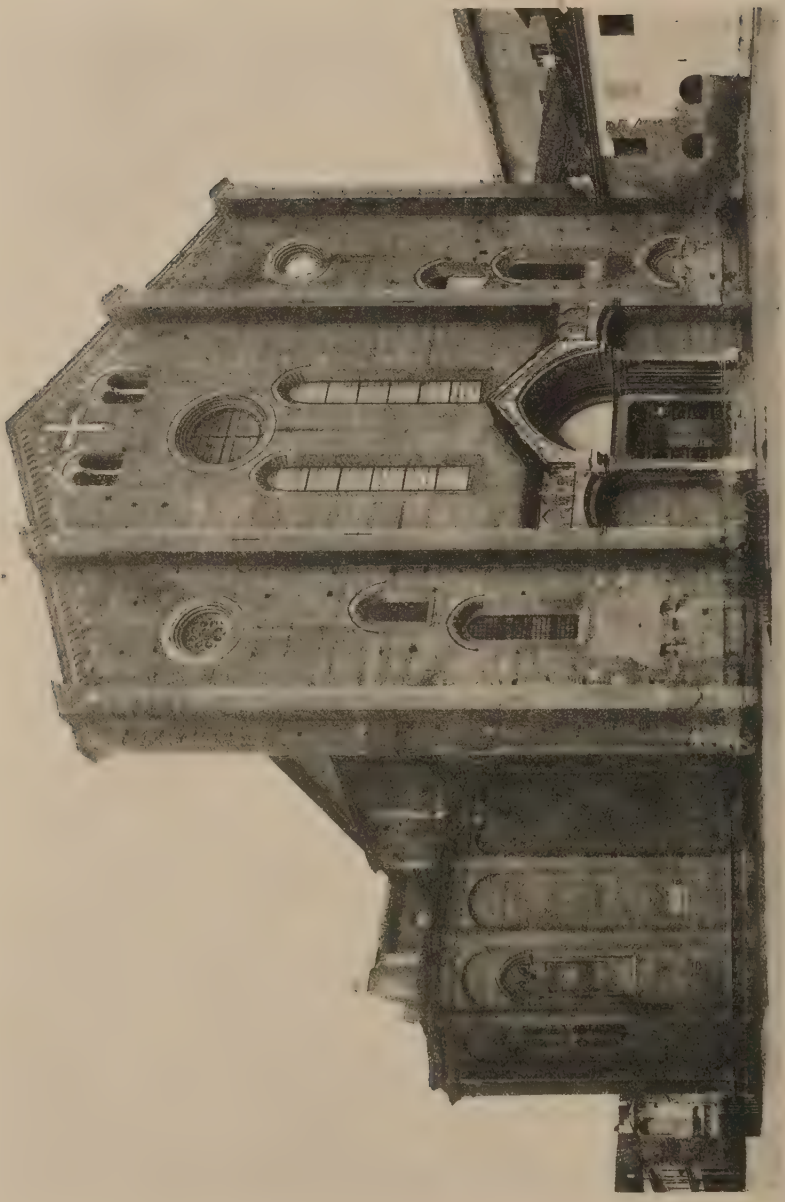

PLATE 158. San Francesco, Bologna.

MARIA BASHKIRTSEFF

Plate 159

Apse of San Francesco, Bologna

This church is one of the most important Franciscan constructions of the Gothic style in Italy, showing a harmonization of national elements with ultramontane forms. It belongs to the middle of the XIII century and is attributed to a certain Giovanni da Brescia.

The sturdy flying buttresses, of a rather yellowish brick, topped by cornices resting on small brackets, support the angles of the apse. The chapels between the buttresses are pedimented and some of them have apses with tall biform windows. This part has been almost entirely restored in a very artistic way with elements furnished by the monument itself. The older part, conserved in the lofty polygonal apse, presents superb proportions. Pilasters adorn the angles between which are great tall ogival arches, in plain finish. The round windows above have recessed mouldings. Around the top of the apse runs a cornice of small pendent arches and courses of carved brick.

The tomb at the left of the apse is one of two at the rear of the church which with their porphyry columns and enameled green tile conical roofs strike a pleasing note of color, as seen upon the bright red and golden yellow brick background of the apse.

The two lofty bell towers seen at the side of the church are separated by a passage which gives access both to the church and the adjoining convent. The older campanile, constructed in 1261, rises from the church itself at the end of the right transept (left as seen in the aquarelle). Unadorned up to the height of the apsidal crown, it terminates in two orders of windows with simple pointed arches. The second order which has open windows seems to have been done over later in different brick of a warmer and more vivid color. It is crowned by a beautiful cornice of pendent arches and saw-tooth courses of brick.

The loftier campanile, erected at the end of the XIV century by the Brothers of the Order, is more imposing and is attributed to Maestro Antonio di Vincenzo, the celebrated architect of San Petronio. *The crown is not finished. The four stories are of different heights, separated by cornices of different design. This superb tower, itself of great impressiveness by reason of its vivid colors and richness of decoration, forms a splendid ensemble with the imposing mass of the apse and transeptal campanile.*

entrance to the South Transept, with its splendid Romanesque arch (restored) and columns of banded brick and stone, is worthy of note (Plate 160).

We find in Bologna a whole group of monuments similar to *San Francesco*, with their rose windows, their long, symmetrical light openings, and their façades outlined along the slopes of the roof with cornices such as previously described. Thus *San Giacomo Maggiore* (Plate 161), which shows a little progress in Gothic feeling, is closely related to *San Francesco*. The great rectangular window may have better lighted the new XVI century interior but it was no substitute for the original rose window. The arches and the tombs flanking the entrance should be noted.

At Verona the fine Benedictine Church of *San Fermo Maggiore* (Plate 162), though belonging to the Romanesque period of the XI and XII centuries, shows in its reconstruction of the early XIV century the Gothic influence of the times. Its brick and marble courses of the façade characterize much Veronese work of the Middle Ages.

Cremona remains more than ever bound to traditional forms and the pointed arch as seen in *Sant'Agostino* seems to follow with difficulty the invading new style (Plate 163).

At Venice, the Church of *Santi Giovanni e Paolo* (Plates 164, 165, 167, Fig. 55) begun in 1246, with elements in its façade of a later epoch; and *Santa Maria Gloriosa dei Frari* or simply *I Frari*, of which is shown a detail of the apse (Plate 168, Fig. 56), represent here the most famous examples of this epoch. The accompanying drawings somewhat indicate the high degree of skill which craftsmanship in brickwork had attained during this period (Figs. 57, 58).

At Vicenza, the beautiful *San Lorenzo* of 1280 (Plate 169) has a sumptuous façade in which the recesses under the pointed arches accommodate the characteristic tombs. The portal which was added in 1344 and the cornices, it will be observed, preserve a purely Lombard feeling. In the church of *San Niccolò* at Treviso (Plate 166), built in the early XIV and restored during the last century, we have the characteristic apse rising into great long windows between lofty pilasters in which the Gothic feeling has well nigh disappeared.

PLATE 160. Vestibule of South Transept, San Francesco, Bologna.

PLATE 161. San Giacomo Maggiore, Bologna.

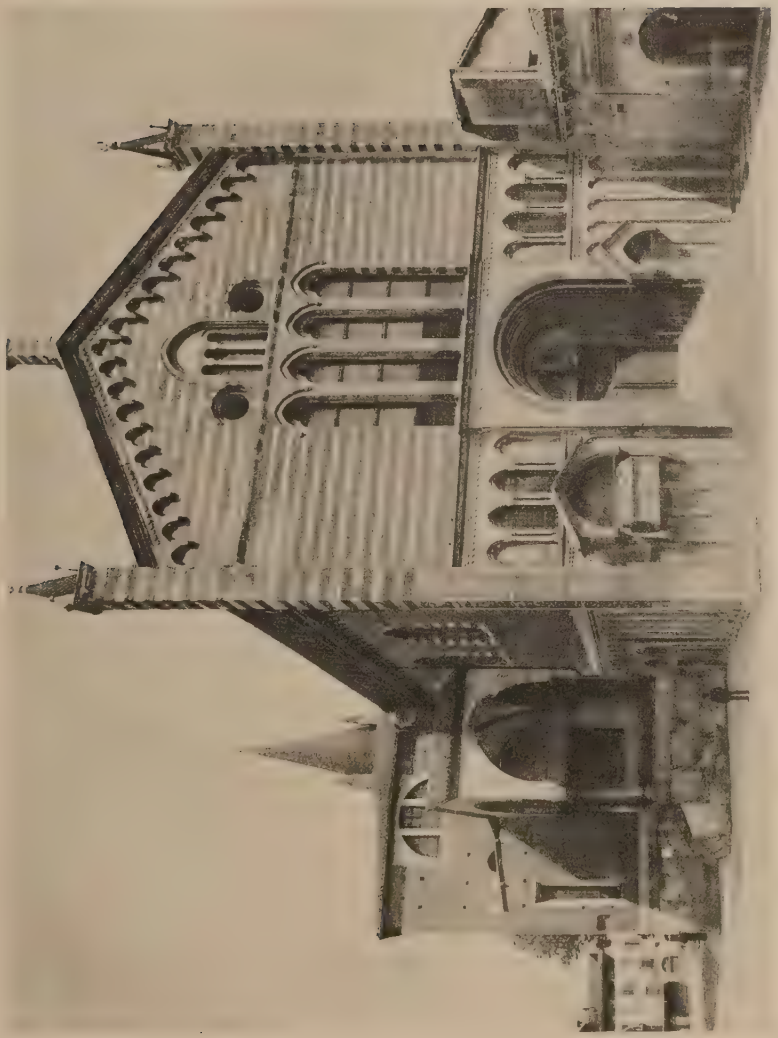

PLATE 162. San Fermo Maggiore, Verona.

PLATE 163. Sant' Agostino, Cremona.

In the Piedmontese churches, as in the Cathedral of Saluzzo and in *San Domenico* at Turin (Plate 170), originally of the XIV century, we frequently find the motive of a very acute triangular pediment above the door, reaching as in *San Domenico* the rose window which gives light to the nave from the façade. This motive was later corrupted in its striving for lobated lines as in the Cathedral at Asti (Plate 171). The interior of *San Domenico* is beautifully finished in brick piers and nave arches and groins (Plate 172). This treatment is frequent, although at times the brick in blended tones of red are so skillfully painted on a thin coating of plaster, covering the common brick core, as to deceive the very elect, as in *Santa Maria del Carmine*, Milan, *Santi Giovanni e Paolo*, Venice, etc.

Central Italy is more completely bound to the traditions of the preceding period. Thus in the Cloister of *San Giuliano* at Perugia (Plate 173), which belongs to the second half of the XIII century, the arches are just barely pointed, having been toned down by a slight chamfer on the intrados, done with a few strokes of the hammer on the finished masonry. In the campa-

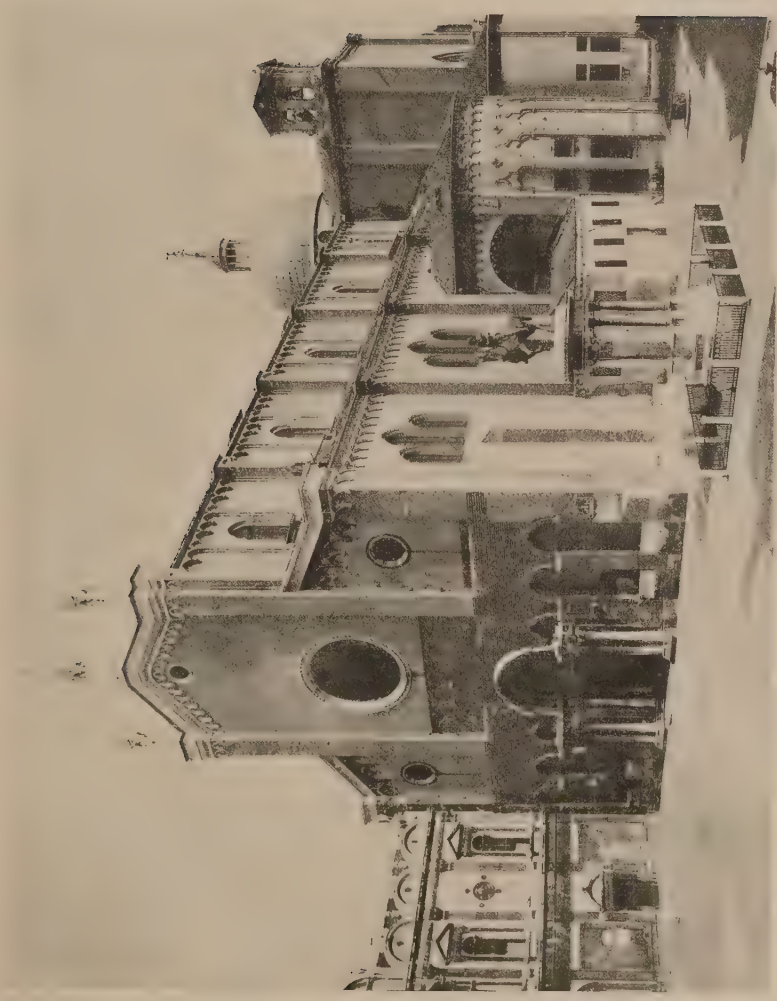

PLATE 164. Santi Giovanni e Paolo, Venice.

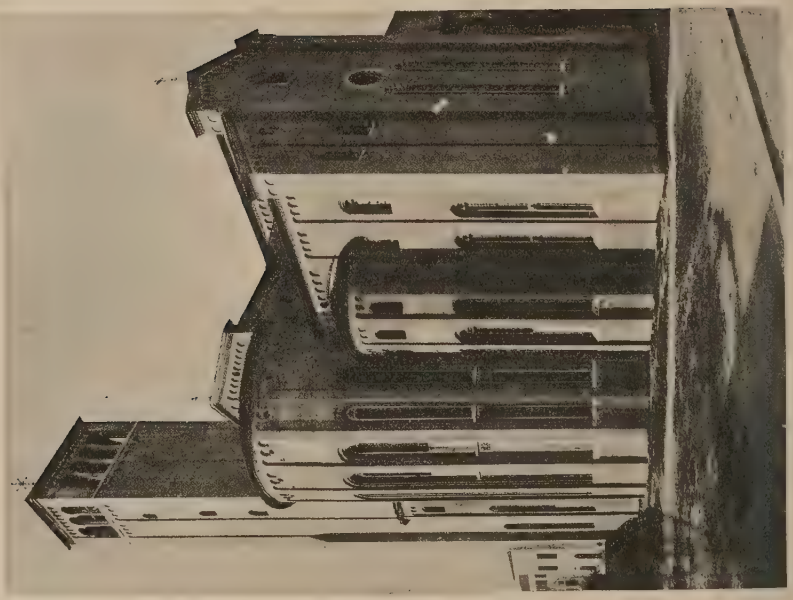

PLATE 166. Apse of San Niccolò, Treviso.

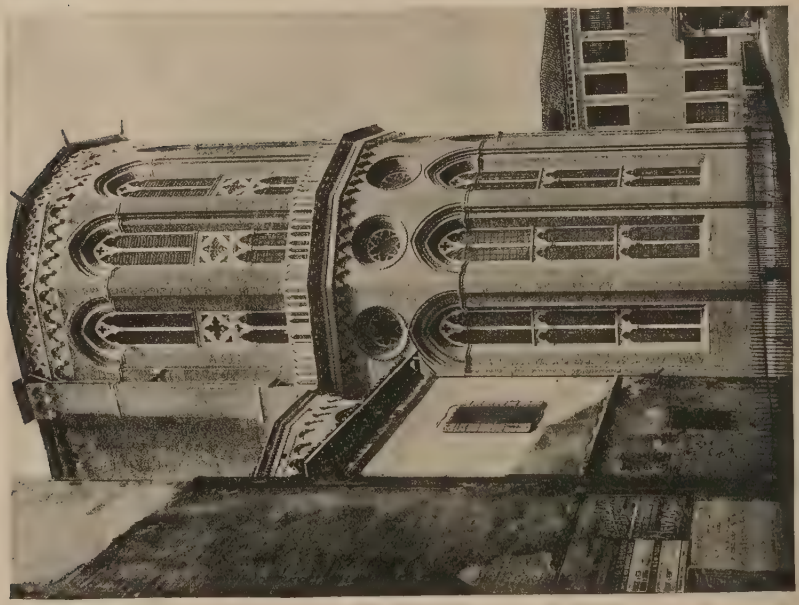

PLATE 165. Apse of Santi Giovanni e Paolo.

MARIA BAROSSO
1923

Plate 167

Chapel of the Madonna Addolorata, Sts. John and Paul, Venice

Next to St. Mark's the great church of Santi Giovanni e Paolo, *modeled after the* Frari, *is the most important ecclesiastical monument in Venice. It is the Westminster Abbey of Venetian history and is in consequence crowded with splendid works of art, especially in sculpture. Founded in 1246, after a vision of Doge Jacopo Tiepolo, for the preaching order of the Dominicans, it was under construction, as we see it today, from 1333 to 1430, when it was consecrated. In dimensions it is 315 by 141 feet, with lofty cross vaults supported on great circular columns.*

The chapel of the Modonna Addolorata *on the right of the church is a later addition but of similar treatment. There is an open area, protected by a railing, about the base at a lower level than the street pavement. Great buttress pilasters, around which runs the elaborate crown of the edifice, join apse and sanctuary. Smaller pilasters at the angles of the polygon rise between the tall pointed windows, twenty-two feet in height by three and a half feet in width, to the imposts of the arches, above which rise labels of concave and convex line, framing the window heads and terminating in flowered finials.*

The striking crown consists of small pointed arches resting on brackets, above which is a row of multiple recessed squares, set alternately normal and on the diagonal, under the simple cornice of brick courses and brackets. The beauty and simplicity of this crown is without doubt one of the most characteristic and splendid examples of Venetian brick laying art of the XV century. The equestrian statue seen in the left background is the famous Colleoni by Verrocchio.

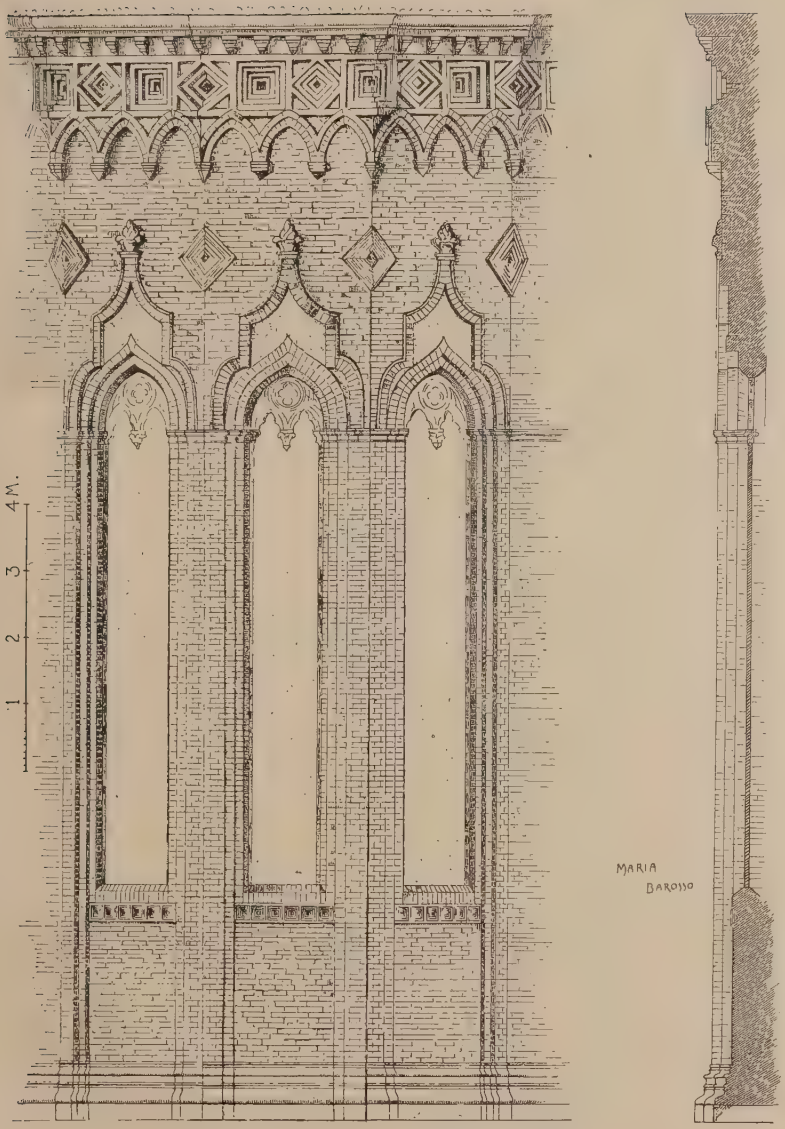

Fig. 55. Detail of the Addolorata, Venice.

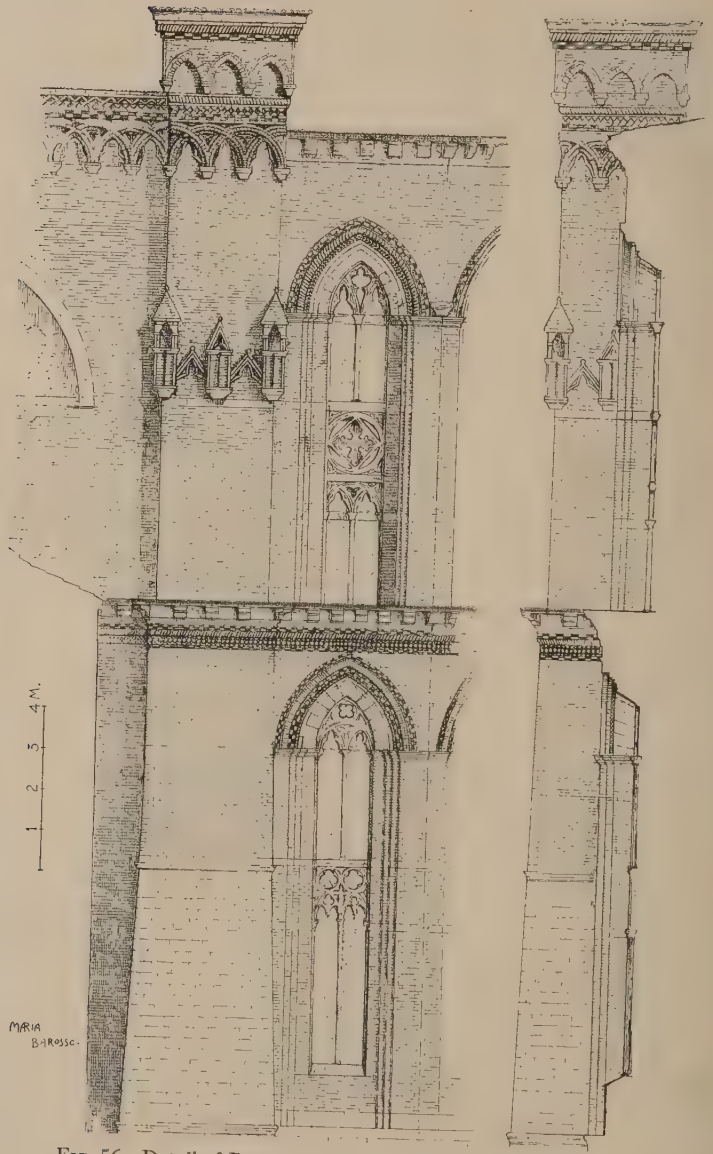

FIG. 56. Detail of Buttress and Windows, the Frari, Venice.

MARIA BAROSSO

Plate 168

Apse of the Frari, Venice

Santa Maria Gloriosa dei Frari, *erected in the XIV century on the site of an earlier church of the Franciscan Brothers, is a superb monument of the Italian Gothic type, from the standpoint of both mass and architectural beauty. In the form of a Latin cross, it measures 305 by 148 feet, with vaultings nearly 90 feet above the pavement. The campanile rises to a height of 214 feet. The famous Assumption by Titian, for a long time displayed in the Academy, has been returned since the war to the* Frari, *for the great altar of which it was originally painted.*

The exterior architecture, remarkable in every part, may be judged by the detail of the apse here shown. In two orders of equal dimension, each side of the polygon is pierced by two tall graceful pointed windows, each of which is divided by mullions and spandrels into four trefoil lights. The crown cornice of brick on marble brackets is finished in diamond points of marble, while the wider and more elaborate cornice between the orders has, besides the marble brackets, various courses of brick in dentils, squares, and rope mouldings. Figs. 56, 58, give a notion of the fine ornamental treatment of the ogival arches.

The side wall shows a rich crown of brick and terra cotta, in moulded courses, above interlaced pendent arches with bracket supports. A striking feature is seen on the double crowned sturdy buttresses, at the junction of apse and presbytery, in the form of three small pedimented brick tabernacles resting on marble brackets. The color effect on the whole is rich and varied, showing yellow gold in the sun, with here and there beautiful vivid and cinnabar reds.

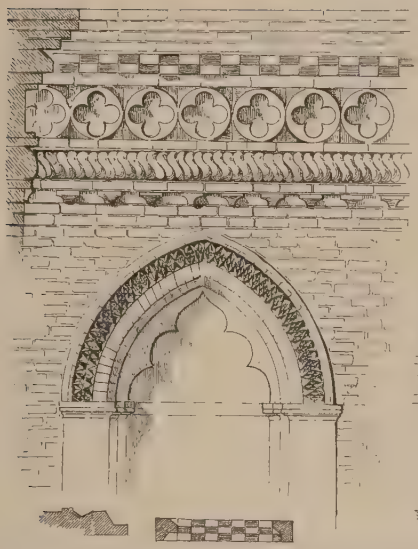

Fig. 57. Detail of Cornice and Window in Santo Stefano, Venice.

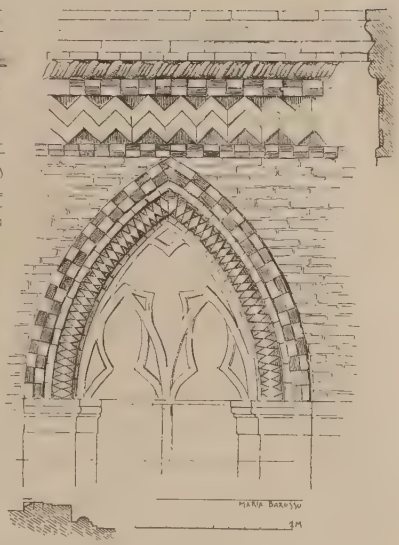

Fig. 58. Detail of the Frari Campanile, Venice.

niles of the XIV century the cornices are to be seen as saw-tooth courses supported on brick set as brackets, much as we have seen in similar structures of the XI and XII centuries.

Among the constructions of this period, *Sant'Antonio* at Padua (Plate 174), which evidently emulates the domical design of St. Mark's at Venice, reveals somewhat independent lines, due to certain hybrid forms which however are fused into a harmonious whole. In the façade, we find horizontal members which indicate a relation to preceding monuments; at the base of the pediment we have an elaborate horizontal arcade which is not found on the sides. On the other hand, the Chapel of the Scrovegni, or *Madonna dell'Arena*, built of beautiful red brick, is very simple and of the purest lines (Plate 175), getting its distinction from the glories of Giotto, housed within. Another church of Padua deserving mention is the *Eremitani*, an old Augustinian church built about 1350 but, as seen today, a restoration of the last century (Plate 176).

The *Certosa of Pavia* (Plate 225) is late Gothic, already growing weary of the pointed arch. On account of the period of

PLATE 169. San Lorenzo, Vicenza.

PLATE 170. San Domenico, Turin.

PLATE 171. The Cathedral, Asti.

PLATE 172. Interior of San Domenico, Turin.

PLATE 173. Cloister of San Giuliano, Perugia.

its construction (1396-1499), it shows traces of the new inspiration which was invading Italy, but because of its pinnacle-crowned buttresses and the lantern which recalls those of the Cistercian churches of France, it may be mentioned here.

Civil construction developed, in the main, along the lines of the preceding period, with the exception of the pointed arch which from now on especially appeared in the upper stories. Cornices were almost always of terra cotta in which the modeling of real masters produced a fine play of light and shade for the eye of the art-lover. Thus at Cremona, in the *Palazzo dei Giureconsulti* (Plate 177) the brick and terra cotta are finely blended in bands, archivolts, and labels by the patient work of the hammer. A very beautiful example of such work is seen in the windows of the *Mercanzia* at Bologna (Figs. 59, 60).

About the *Piazza Vittorio Emanuele* and the adjoining *Piazza del Nettuno*, Bologna, one of the most picturesque and interesting public squares in Italy, are grouped such buildings as the *Palazzo Comunale* (Plate 178), the *Palazzo dei Notai* (Plate 179).

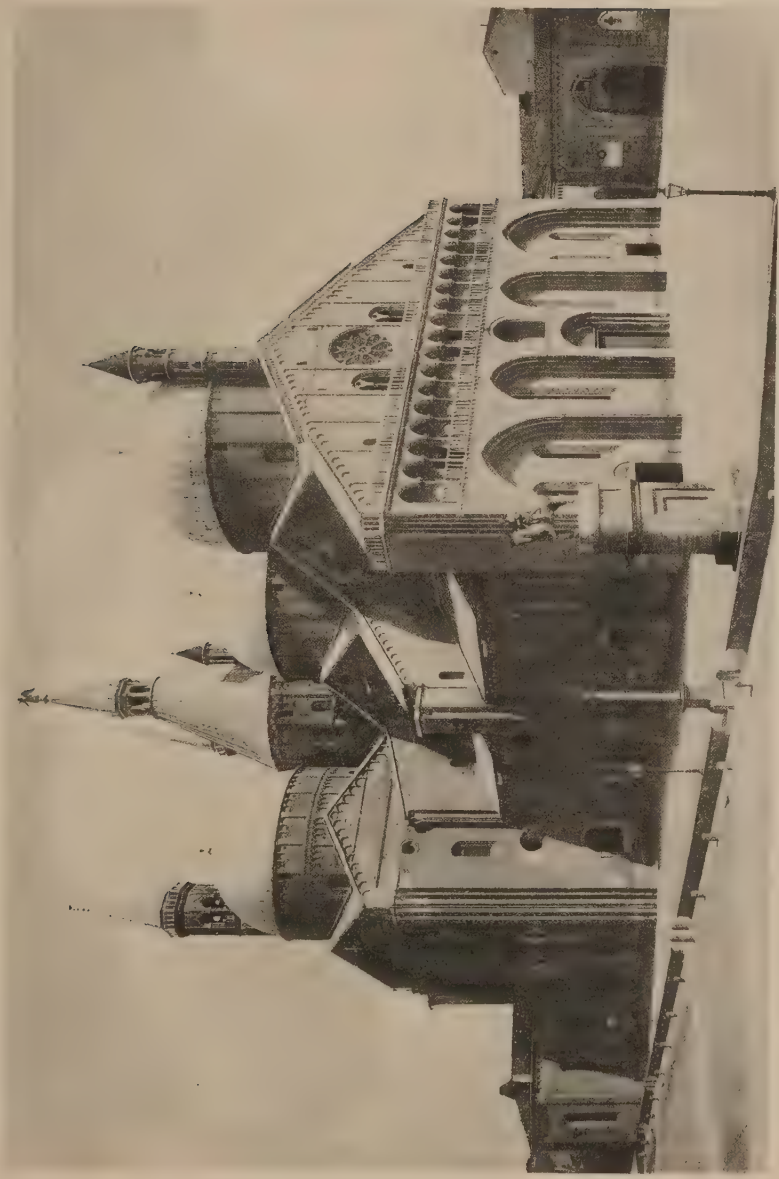

PLATE 174. Sant' Antonio, with Donatello's Gattamelata, Padua

PLATE 175. Chapel of the Madonna dell' Arena, Padua.

PLATE 176. Church of the Eremitani, Padua.

PLATE 177. Palace of the Giureconsulti, Cremona.

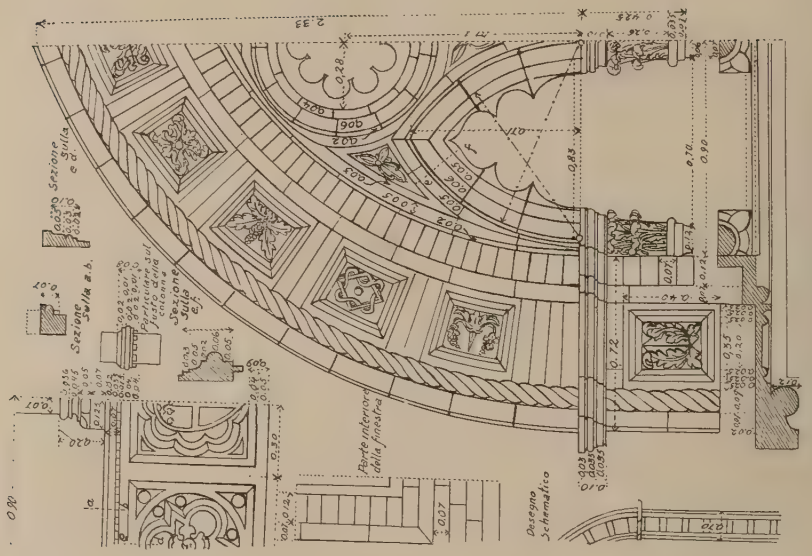

Fig. 60. Detail of Window in Fig. 59.

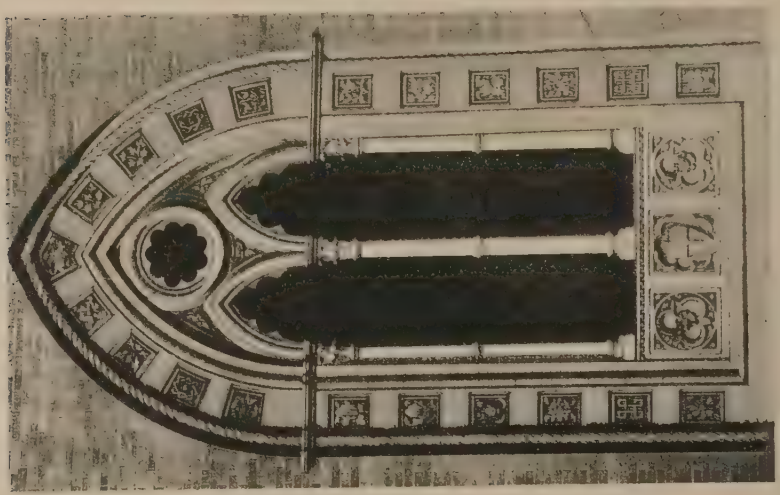

Fig. 59. A Window of the Mercanzia, Bologna.

PLATE 178. Communal Palace, Bologna.

PLATE 179. Palazzo dei Notai, Bologna.

PLATE 180. Palazzo di Re Enzio, Bologna.

PLATE 181. Palazzo del Podestà, Bologna.

PLATE 182. Malatesta Palace, Fano.

the *Palazzo di Re Enzio* (Plate 180), the *Palazzo del Podestà* (Plate 181), and the great church of *San Petronio* with its unfinished walls. These buildings cover the period from the XIII to the XV centuries and are thoroughly characteristic of the period and the locality. At Fano, in the Marches, the *Palazzo Malatesta* (Plate 182) affords an excellent example, while the *Mercanzia*, at Bologna (Plate 157), bears us rapidly toward the Tuscan-Gothic. Here, the brick architecture of this period reaches its height in the Communal Palace of Siena (Plate 183) with the harmony of its masses, the accuracy of its detail, its own peculiarly characteristic three-light openings, and the quiet color of the brick, which is a not too vivid orange tone. At Verona the Tower of the Commune with its splendid pointed three-light openings and graceful lantern is justly celebrated by Street, whose fine rendering is here reproduced (Plate 184).

At Genoa, in the *Palazzo San Giorgio*, we find again an attempt at effect in the arrangement of the brick (Plate 185); for example, in the lunette on the left we have the *opus spicatum* or herringbone pattern, and in that of the center an attractive variation by running the same pattern diagonally.

PLATE 183. Communal Palace, Siena.

The castle is of great importance in this period, still representing, in a way, a place of defense but made more comfortable as a dwelling than in earlier times. The *Castello Sforzesco* at Milan, and the *Estense* at Ferrara, to be treated in the next period, should be studied as very remarkable examples.

Side by side with palace and castle, there developed the houses of the lesser gentry which had already asserted itself in the Romanesque period, such for example as the old home at Lucca (Plate 186). At San Gimignano in Tuscany, an important example is the *Palazzetto della Propositura*, or Provost's Palace, still of the XIII century (Plate 187). The small door between the two beautiful two-light openings gave access to a wooden balcony, of which the bracket supports alone are now seen. In this little Tuscan hill town, this type of dwelling had a very happy development, as illustrated in the two small adjoining houses, shown in Plate 188. The one on the right, with a flattened arch over the single pointed portal, has in the first story two Florentine windows and in the second a large three-light opening in the style of Lucca, and is surmounted by a crown of small round pendent arches. The house on the left has in the first story two two-light openings, each with ogival arches enclosed within round arches; and in the upper story, also two two-light openings with pointed arches surmounted by pointed arches in the Sienese style, in which the brick joints

PLATE 184. Tower of the Commune, Verona, after Street.

PLATE 185. Palace of St. George, Genoa.

PLATE 186. Monte di Pietà, or State Pawn Shop, Lucca.

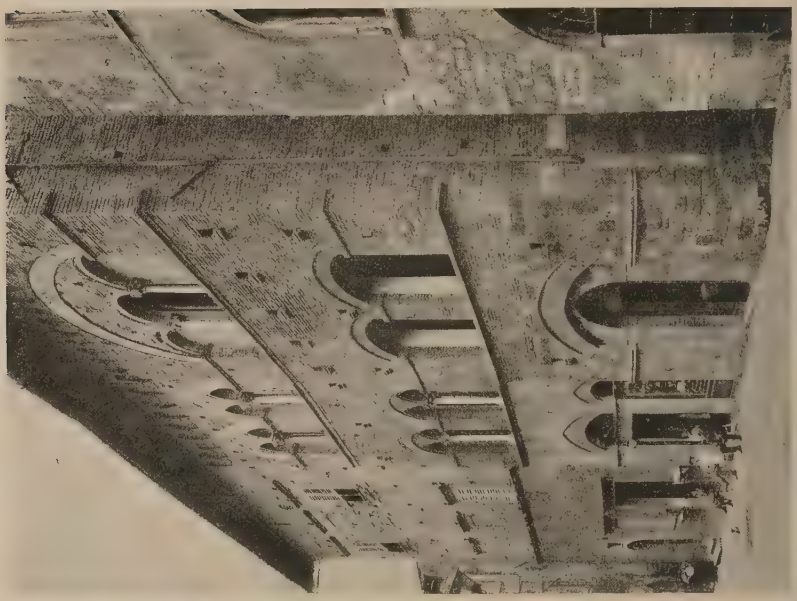

PLATE 188. Tinacci Palace, San Gimignano.

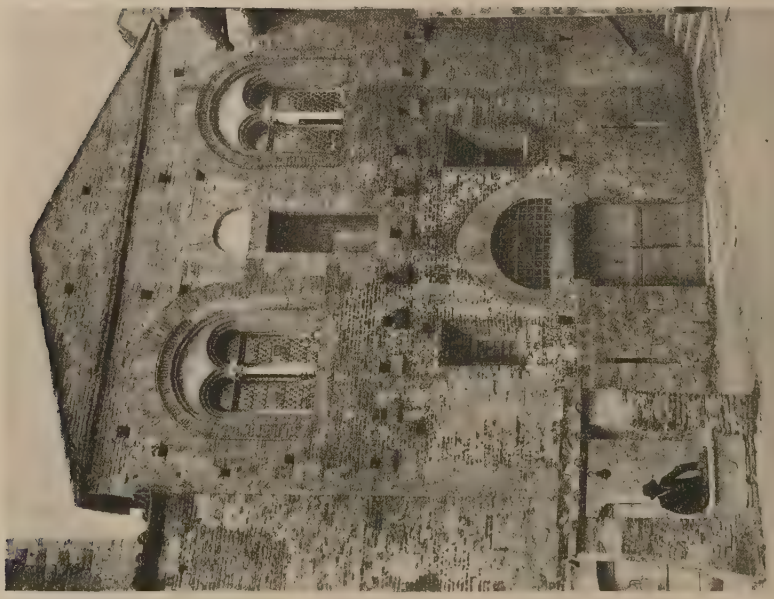

PLATE 187. Old Provost's Palace, San Gimignano.

PLATE 189. Pratellesi Palace, San Gimignano.

PLATE 190. Palace Borgheresi, San Gimignano.

PLATE 191. Detail of Franzesi Palace, San Gimignano.

converge to a single center at the center of the arch span. The *Palazzo Pratellesi* (Plate 189), built in 1353, has very elegant two-light openings with brick arches, decorated as those in the *Palazzo Franzesi* (Plate 191), which show small lions and ivy leaves over the extrados. The *Palazzo Borgheresi* (Plate 190) is not inferior in its wealth of decoration. Especially noteworthy are the alternate bands of light and dark brick in the upper stories. At Siena, the well-known *Palazzo Buonsignori* (Plate 192) is a priceless example of the purest Sienese style, while the *Palazzo Sansedoni* (Plate 193) reveals the vast extent to which these constructions were carried. Bologna has a striking example in the *Palazzo Isolani* (Plate 195) which reveals the beauty of its original façade amid later inferior constructions. A charming entrance to the *Casa della Porta* at Novara shows excellent workmanship in handling brick and terra cotta (Plate 196).

The Venetian Gothic asserts itself splendidly in palaces where the brick is treated with a new feeling. It is a striking characteristic that cornices project very slightly although they run along almost even with the roof line. Windows often have four and six

PLATE 192. Buonsignori Palace, Siena.

PLATE 193. Sansedoni Palace, Siena.

PLATE 194. Court of the Cà d'Oro, Grand Canal, Venice.

PLATE 195. Isolani Palace, formerly Bianchini, Bologna.

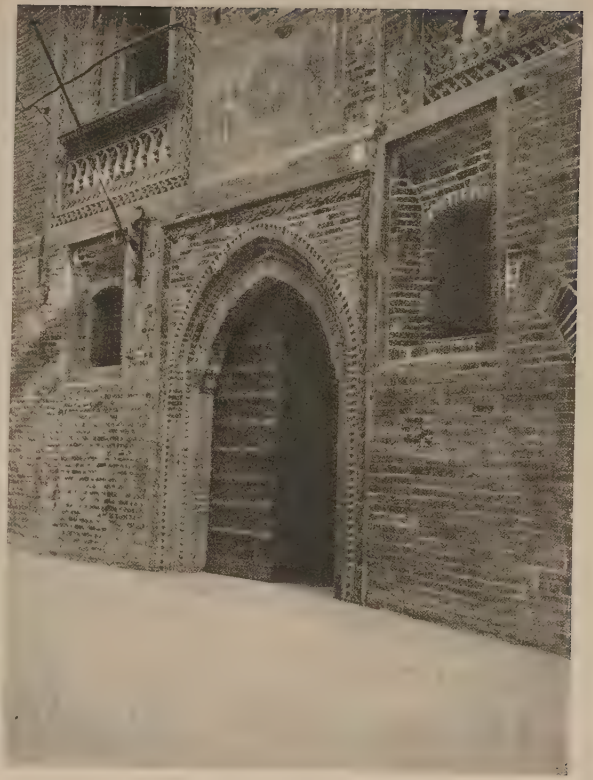

PLATE 196. Casa della Porta, Novara.

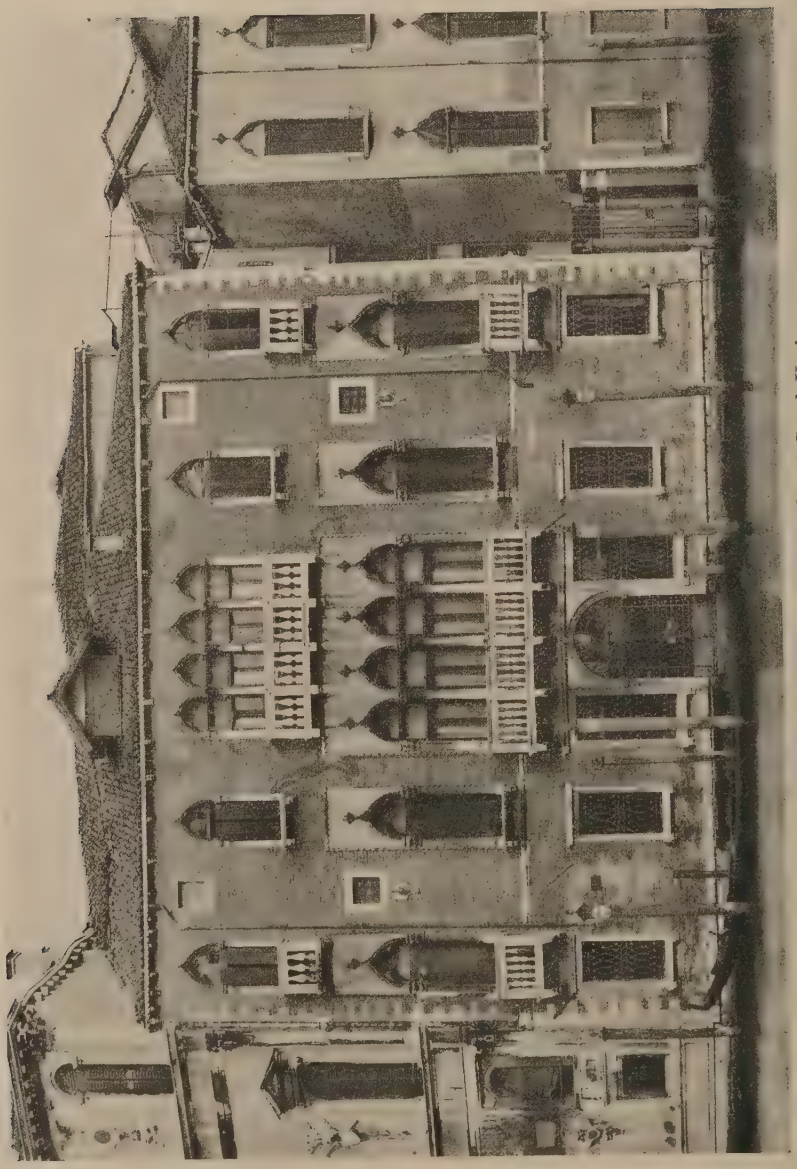

PLATE 197. Nani Mocenigo Palace, Grand Canal, Venice.

PLATE 198. Ariani Palace, Venice.

PLATE 199. Ambassador's Palace, Grand Canal, Venice.

PLATE 200. Winding stair in Contarini dal Bovolo Palace, Venice.

lights and the pointed arch strives after new effects, resulting at times in a veritable lacework of stone carving (Plates 197, 198, 199). The bricks of a pinkish yellow color bring out the decorations in Istrian stone into stronger relief. The courtyards are worked out in every detail, the brick pavements often laid in the old *opus spicatum* pattern (Plate 194), or perhaps the mason lavishes his skill on a winding stair at one side of the court as seen in Plate 200. The Venetian builders did not adopt the structural phases of the northern Gothic architecture but contented themselves with its ornamental features in the pointed arch, worked out in new and elaborate forms in all openings. Late in being adopted, these Venetian examples may be taken as marking the end of the Medieval Period, just before the dawn of the Renaissance.

Prof. Ing. Enrico Verdozzi

RENAISSANCE AND BAROQUE PERIODS

Brick Manufacture and Construction

During the Renaissance and following periods, the traditional methods of manufacturing brick remained practically unchanged and the products obtained were almost always of the best quality. As might be expected, brick dimensions varied according to locality. Manufacture continued to develop greatly in the Valley of the Po, in the Emilia, in the Marches, and generally where stone for construction was scarce.

The writers of the period tell us of the burnt clay industry and the good qualities which should be sought. For example, Leon Battista Alberti[1] advises digging the clay in the autumn, leaving it weather all winter, and moulding the brick only in the spring. He says that the brick ought not to be set in the kiln until they are very old, and to be considered old, they ought to have undergone a period of drying, if possible in the shade, for at least two years. Brick, continues Alberti, should be very thin in order to burn better, and smoothed as soon as taken from the kiln, when still warm. Among the better clays for brick he considers those of Samos, Arezzo, and Modena.

The moulds were usually such as those shown here in Fig. 61 which were used to make the brick for the construction of the cupola of the Cathedral Church or *Duomo*, *Santa Maria del Fiore*, at Florence.

In northern Italy and especially in the Emilia, the manufacture of architectural terra cotta also had at this time a very great development. It was shaped either in moulds, modeled by hand, or perhaps cut after a preliminary burn. It was a most flourishing industry and permitted a rich and perhaps a little too excessive decoration, causing the architecture of this period to acquire a special character. How splendidly the terra cotta industry flourished is proved by the fact that even in the houses of the country people there was not only an endeavor for a certain elegance of composition but an extensive use of this material.[2]

1. L. B. Alberti: *De re aedificatoria*, lib. 2. 2. Malaguzzi-Valeri: *L'architettura a Bologna nel Rinascimento.*

After the rapid progress and perfection of brick wall construction in Roman antiquity and the most varied possible structural and decorative uses made of brick, from the days of Augustus to the end of the Medieval period, there was indeed from now on little to do other than what could be found in examples of the preceding epoch. In the marvelous awakening of Italian art to new forms, in the XV century, revealing itself in a revived and enthusiastic interest in the ancient world, in fervent aspirations for greatness, in freshness of ideas, in elegance of form, and in nobility of mind, it is strange how there was neglected every attempt at perfecting the practical side of construction.

While decorative forms reached the utmost splendor, there is noted, if not a real decadence, certainly a regression in the art of building. The almost complete loss of the old Roman traditions of construction, which had developed the most gifted builders of the world, the excessive reliance placed upon the resistance of the materials and, still more, upon the bonding strength of the mortar, as well as the fever of construction, were all concomitant causes which accentuated the neglect shown in constructing the framework of the edifice.

The builders of the Renaissance, in the main, followed what Milani calls the "Latin tradition," or the organic system of gathered thrusts on compound buttressed columns as developed in the preceding period. Granting this established constructive usage and the imperative demand of the time for the old Roman external decoration in cut stone, it was a logical consequence that building assumed a function essentially static and lost that organic unity of expression, or perfect correspondence between outer form and inner structure, which is proper to every architectural work. There was thus established a method of treating the decorative covering as independent of the bearing frame-

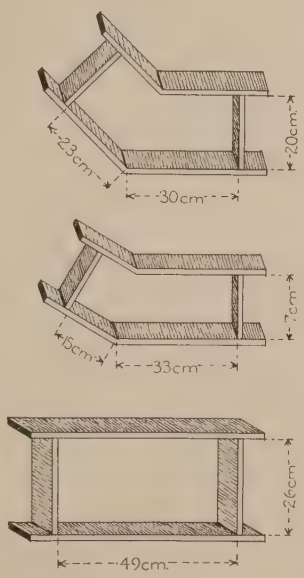

Fig. 61. Brick Moulds.

work which added to a rigid concept of constructive practice, caused no little neglect of solidity and bearing strength in the building. Thus much premised, we shall be able to see what employment brick had in the various parts of construction during this period.

The masonry of piers in general was thinned down and no longer presented tenacity and cohesion, or those qualities of especial solidity which were the chief merits of the old Roman construction. In every region, rather in every locality, those particular forms of construction were adopted which best corresponded to the economic use of the materials and methods of work for that particular place. Thus, besides walls exclusively of brick, we often see masonry combined of stone and brick as in the preceding period, and we have examples, especially at Rome, of the so-called *tegolozza* or walls built entirely or in part of burnt clay materials from the ruins of ancient monuments. Sometimes we find walls of great thickness with facings of brick, connected by transverse partitions in a way to form so many caissons which were meant to be filled with gravel and lime, but sometimes left empty either by the fraud of the builders or by the negligence of those directing the work, as for example in the *Castello Sforzesco* at Milan.[1]

Arches, Vaults, and Cupolas

If, in the period of the Renaissance, we encounter a return to the Greek and Roman decorative forms, we find in the wall structure, as has been said, the continuance of the Latin tradition. There was abandoned, in the main, the characteristic groining of the Gothic period, although there did not disappear the practice of providing with ribs some types of these vaults in which brick largely entered. The arches are for the most part of brick, and sometimes we see very striking examples of them, as in the four great arches supporting the cupola of Saint Peter's at Rome.

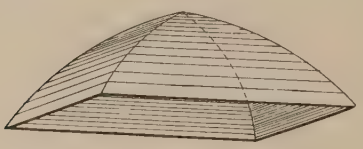

Fig. 62. Pavilion Vault.

In vaults, almost always of brick, there still remained, however, some groining. Besides, the

1. Luca Beltrami: *Il Castello di Milano sotto il dominio dei Visconti e degli Sforza*, 1369-1535. Malaguzzi-Valeri: op. cit. p. 68-69.

special form of vaulting known as *pavilion*, which covered square, rectangular, or polygonal compartments, came into vogue (Fig. 62); and the brick vault *in foglio*, where the brick were set flat, as shown in Fig. 14, page 18, was also much used. Often this type of vault had a purely decorative function and was separate from the roof or the ceiling above. In these cases, the reinforcement of the cement is not used in the entire vault, but is limited to the groins. We have very important examples of this, and that too with arches of wide span, in such structures as the Sistine Chapel of the Vatican, the Farnese Palace, and the loggias of *Santa Maria Maggiore* at Rome.

In the construction of cupolas, the old Roman idea of the single solid dome was abandoned not only because it gave rise to various disadvantages, due especially to humidity, but because it required very heavy masonry both in the cupola itself and in the piers. However, we have some modest examples of it, as the cupola of the Rotunda at Vicenza, a famous building of Palladio (1550-53) but not completed until 1606 by Vicenzo Scamozzi. In general, the cupola was always in a double form, that is, had some sort of covering or shell above it, and occurred in two distinct types, the *roofed* and the *doubled* cupola, that is, either the dome was within the walls, covered by a roof, as already adopted in the Middle Ages, or the dome was simply doubled.[1]

From Rome the idea of groining was again taken up and carried to perfection. This gradually developed into true ribs which assumed the chief static function of support, forming a bearing skeleton, and thus leaving to the sections of the cupola, which rested upon the ribs, almost solely the function of a covering. In cupolas, brick was almost always the sole material adopted, except sometimes when stone was used in the ribs, in the rings of the lantern, or in the parts subjected to heavy thrusts.

In particular, the characteristic brick construction of the two great cupolas, those of the *Duomo* at Florence, and of Saint Peter's at Rome, merit citation.[2] In the first, Brunelleschi, with the chief aim of avoiding as far as possible the employment of a centering or an immense template, adopted for the con-

1. Strack: *Central und Kuppelkirchen der Renaissance in Italien.* Strack: *Der Kirckenschmuck.* 2. Milani: *Ossature murali* Vol. 3, p. 42 ff.

struction of his marvelous cupola a most ingenious system in setting the brick. He had them set vertically, following naturally the curvature of the cupola as construction proceeded, and at the same time horizontally, thus forming a herringbone effect, no supports being necessary as the adhesion of the mortar was sufficient to hold each brick as it was successively set in place (Fig. 63). A similar procedure with some variation was adopted in the construction of the cupola of Saint Peter's (Fig. 64).

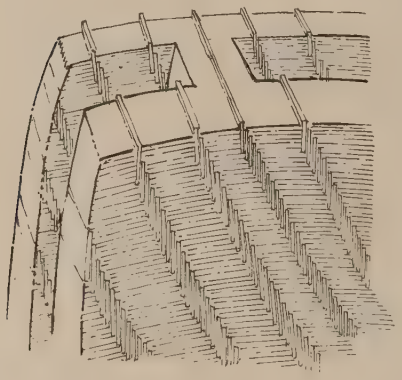

Fig. 63. Brick Vaulting, Duomo, Florence.

Most beautiful examples of static construction are to be found in the cupolas of the Baroque period, and in the following XVIII century. Giovan Battista Guarini especially excelled in this daring construction. His constructive virtuosity, as seen in the cupola of *San Lorenzo* at Turin (1686), with its intersecting groins on a planimetric star-like pattern, makes one think almost of a miracle in static equilibrium.

Brick in Decoration

During this period, the use of brick in the decoration of buildings lost in part its importance, inasmuch as the seeking for and adoption of new forms, together with the very considerable development of decorative sculpture, necessarily required the employment of stone and marble. However, brick was still widely employed in the facing of external walls, the work being very carefully done with

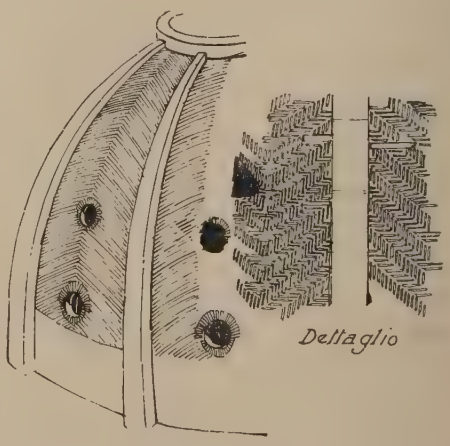

Fig. 64. Brick Vaulting, St. Peter's, Rome.

PLATE 201. Court of House at Ascoli Piceno.

PLATE 202. Door of Baglioni Palace, Città della Pieve.

PLATE 203. Court of the Ducal Palace, Urbino.

thin brick and very thin mortar joints. Often this facing was put on after the internal nucleus of the building was already up, and done in such a way as to procure a good bond between the two. Examples of very beautiful facings of this kind are found from the XV to the XVIII centuries.

Sometimes brick was used for pilasters, columns, and in general for all those architectural elements which, by reason of the simplicity of their form, lent themselves to an easy and natural employment of this material. On the other hand, for cornices, capitals, door and window architraves, and for all other decorative parts, almost without exception, cut stone was employed from the XV century on.

However, in Lombardy and the Emilia, as well as in other regions, the widespread employment of brick in its most varied applications continued. We often see, especially in houses of the more modest type, admirable and ingenious examples of decorative brickwork, of which we may cite in passing a little court of a house at Ascoli Piceno (Plate 201); the small Baglioni palace at Città della Pieve (Plate 202), the little Umbrian town in which Perugino was born; and the house of Ariosto at Ferrara

(Plate 212). For essentially decorative work, in case cut stone was lacking, terra cotta was used of which we see a great variety of examples offering strikingly beautiful effects.

Besides decorative terra cotta, there was also a great development in polychrome decoration, obtained by means of an intelligent and happy combination of cut stone and brick, as seen in the eastern part of *Santa Maria delle Grazie* at Milan, constructed by Bramante, the *Certosa of Pavia*, etc., or by means of plaster and graffito, limited however to small, wisely selected sections. Brick was also largely used in pavements, of which characteristic examples survive, such as found in the *Castel Sant' Angelo*, in the Church of the *Filippini* at Rome, or in *San Sepolcro* at Bologna.

Renaissance, Period I

Pointed architecture having been abandoned, there began about the year 1400, after a period of transition, the application on a wide scale of classical forms. These were not reproduced coldly or with pedantic imitation but in a new, broad spirit of freedom and artistic élan. The movement which was initiated by Brunelleschi, with a harshness that impelled him to conquer all difficulties at a blow, without artifice or meretricious adornments and almost as if in scorn of decoration, was at once followed in every part of Italy by a great number of most capable artists, taking on in every locality its own proper characteristics. Indeed, this was one of the principal features of this first period. Every one followed it according to his individual ideas, always with the greatest refinement and with a profound artistic feeling, adding that clever and original form of decoration which, taking its cue from classical elements, was essentially inspired by the flora and fauna of the region, and which formed another characteristic of this period.

At Florence and in Tuscany generally, where the movement was initiated, we do not have particularly important buildings in brick. There stone bore sway and only terra cotta decoration found splendid application. At Siena, we have some brick construction of this period in which there was a mixture of tradi-

tional Gothic motives with others taken from classical art, as seen in various palaces of the time.

The new art was propagated from Tuscany throughout contiguous provinces. In Umbria and in the Marches, we find brick construction widespread, especially in buildings of minor architectural value, in which door and window frames, composed entirely of carved brick, are characteristic. Many are the monuments that one might cite. One of exceptional value is the Ducal Palace at Urbino of which we see an angle of the fine court in Plate 203, a sumptuous residence completed about 1467, in which, however, the principal decorative parts are in cut stone. In the Marches, the Communal Palace at Jesi (1481) with its rustic brick facing,[1] is a striking example. In the Emilia, burnt clay products found, as has been said, a very wide vogue and innumerable applications. In this region, architecture ran more to richness of decoration than to purity of line. In the Bovi-Silvestri palace at Bologna we find one of the first examples in which motives of the Renaissance are seen mixed with Gothic elements such as windows with pointed arches in a transition style that has produced not a few monuments.

Where, however, the Renaissance triumphed was in the Church of *Santa Caterina*, also at Bologna, constructed in 1478 by Niccolò Marchionne da Firenze and Francesco di Dozza. The splendid façade, framed in with four great pilasters supporting the rich entablature, terminates in arches forming a line at the crown, something very rare in the Emilia (Plate 204). In 1480 the goldsmith Sperandio of Mantua lavished on the door, the round windows, now closed, and on the lateral squares a rich and inexhaustible decoration in terra cotta. Also the Church of *Spirito Santo*, recently restored, owes its importance more to its elaborate terra cotta embellishments than to its architectural lines. These edifices show us how greatly the architecture of this region differs from the elegant and sober style of the neighboring Tuscany.

Among domestic edifices, we find at Bologna, as in the *Palazzo Fava* and the *Casa Gioanetti* (Plates 205, 206), constructed toward the end of the XV century, very conspicuous characters of Bolognese architecture. The porticos with their round arches

1. Antonio Gianandrea: *Il palazzo del Comune di Jesi.*

PLATE 204. Façade of Santa Caterina, Bologna.

PLATE 206. Casa Gioanetti, Bologna.

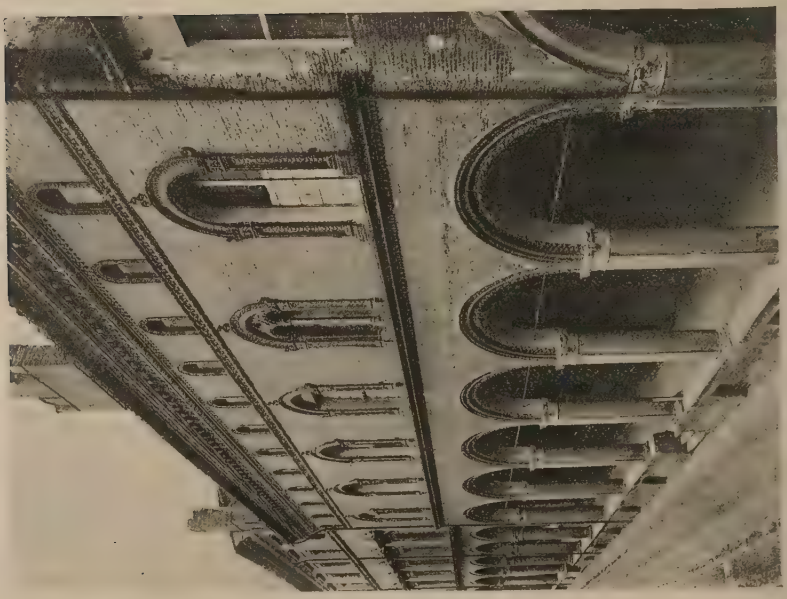

PLATE 205. Fava, formerly Manfredi, Palace, Bologna.

PLATE 207. The Malaguti Palace, Bologna.

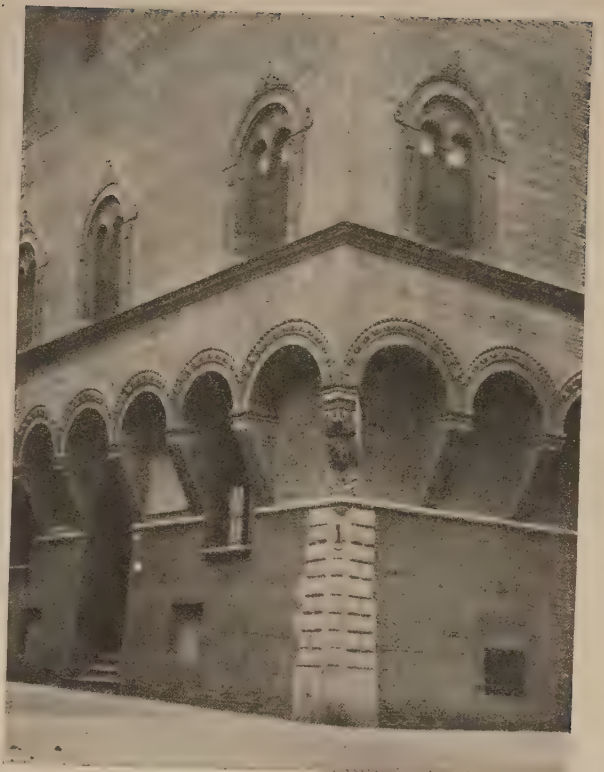

PLATE 208. Casa dei Carracci, Bologna.

PLATE 209. San Pietro, Modena.

PLATE 210. Chiesa Nuova, Modena.

PLATE 211. Court of the Costabili Palace, Ferrara.

PLATE 212. House of the Poet Ariosto, Ferrara.

PLATE 213. Abbey of San Cristoforo, Ferrara.

PLATE 214. An Angle of the Castello Estense, Showing Moat, Ferrara

PLATE 215. La Sagra, Carpi.

PLATE 216. San Bernardino dei Zoccolanti, Urbino.

resting upon columns, having very elegant diversified capitals, constitute one of the characteristics of the place, due to the necessity of protection from winter snows and summer heat. Here also beautiful decoration in terra cotta triumphs. A frequent motive found in the Bolognese palaces of this period, as a last reminiscence of the Gothic, may be glimpsed in their singularly grouped ornamental parapets or battlements, as seen in the *Palazzo Malaguti* (Plate 207). Another palace in which we find a very widespread architectural motive is that of the so-called *Casa dei Carracci* (Plate 208). The projecting arches, which are built in place of the portico and sustain the upper floor, offer a most notable example; its decoration in terra cotta and pictorial polychromy are of exceptional importance.

At Modena, we find the Church of *San Pietro* (Plate 209), built in 1476 by Pietro Barabani, showing an admirable brick façade of the early Renaissance, with which it is interesting to contrast and compare the Baroque façade of the neighboring *Chiesa Nuova* of the early XVII century, built by Alverna (Plate 210).

Ferrara is very rich in brick architecture and ornamental terra cotta. The court of the *Palazzo Costabili* (Plate 211), which is distinguished by reason of its composition and the harmonious combination of stone and brick, is by Biagio Rosetti (1502). The house of Ludovici Ariosto (Plate 212), although very simple, is pleasing in its well balanced composition. The handsome Carthusian Abbey Church of *San Cristoforo* belongs to the first half of the XVI century and is now a part of the *Campo Santo* (Plate 213). The *Castello Estense*, seat of the famous Este family, was originally built by Bartolino Ploti for Niccolò II, in 1385, and restored after the earthquake in 1570, during the times of Alphonse II, by Alberto Schiatti (Plate 214). At Carpi, *La Sagra*, the old cathedral, altered at the beginning of the XVI century, has a very interesting façade by Baldessaro Peruzzi. The ancient Romanesque portal has been retained (Plate 215). In the Marches a fine composition in brick is the monastery church of *San Bernardino dei Zoccolanti* near Urbino (Plate 216), interesting because of its connection with the name of Bramante who is said to have worked as pupil and assistant with the architect Luciano da Laurana.

PLATE 217. Entrance, Castello Sforzesco, Milan.

PLATE 218. Castello Sforzesco, Torre Umberto Primo, from Piazza d'Armi, Milan.

PLATE 219. Castello Sforzesco, Torre Bona di Savoia, Milan.

PLATE 220. Castello Sforzesco, Milan. Northwest Angle.

PLATE 221. The Ospedale Maggiore, Milan.

PLATE 222. Santa Maria delle Grazie, Milan.

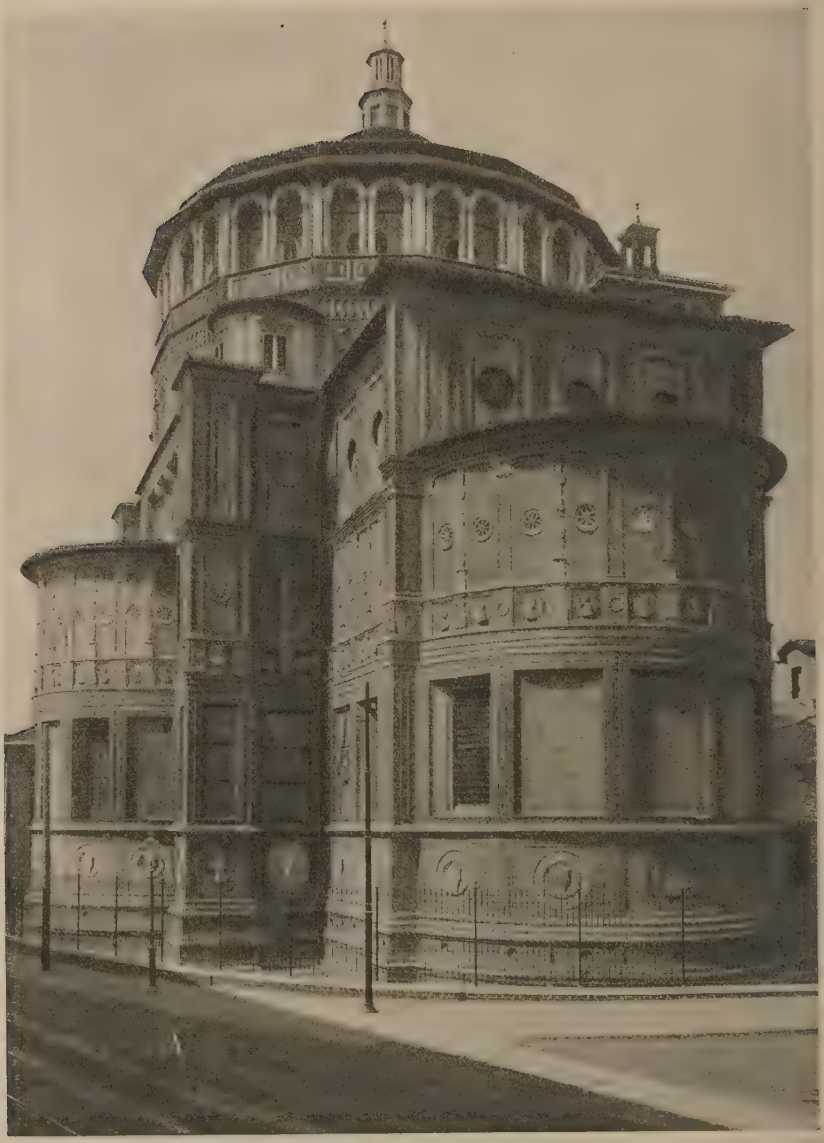

PLATE 223. Apse of Santa Maria delle Grazie, Milan.

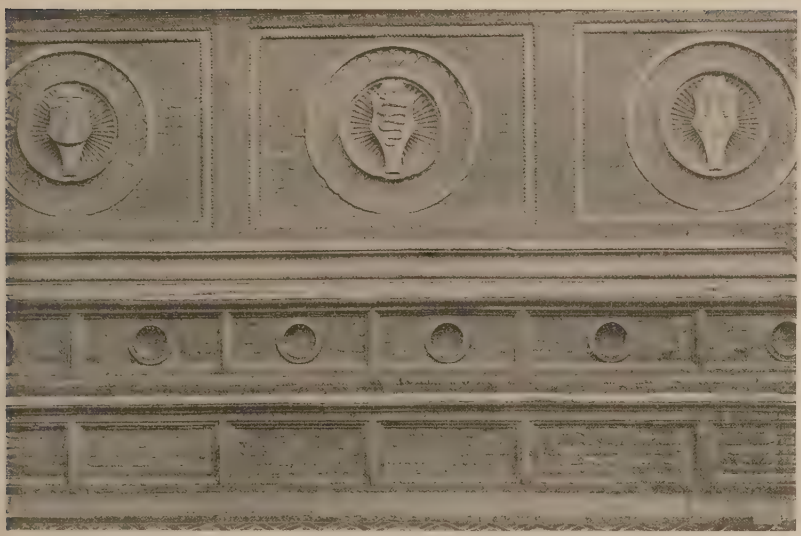

PLATE 224. Panels in Apse of Santa Maria della Grazie, Milan.

In Lombardy, throughout almost the entire Valley of the Po, there is a widespread use of brick. The want of cut stone and the abundance of the best clays, for the manufacture of either constructive or decorative products, led the builders to employ brick and terra cotta extensively. In order to relieve the monotony of the plain brick wall surface, polychromy was introduced by the use of modest bands of plaster along the lower edge of cornices in a way to accentuate their distinction from the walls. The plaster was then gradually widened and to it was added graffito and polychrome embellishment to moderate the sharp contrast between the red brick and the white plaster. Finally, the plaster extended over the entire wall leaving exposed only the terra cotta. That was also done to conceal the hasty and negligent work which was not slow to show itself in building operations.[1]

Commencing with Milan, we cite among various examples of brick architecture the *Castello Sforzesco* (Plates 217-220) originally built as a *Rocca Viscontea* for Galeazzo Visconti II, the latter half

1. C. FUMAGALLI: *Di Sant' Ambrogio.* L. BELTRAMI: *Reminiscenze di storia e d'arte nel suburbie e nella città di Milano,* 1899.

PLATE 225. Rear View of the Certosa of Pavia.

PLATE 226. Detail of Church and Little Cloister of the Certosa of Pavia.

PLATE 227. Terra Cotta Decorations in the Great Cloister of the Certosa of Pavia.

of the XIV century. Destroyed during the Ambrosian Republic (1447-1450), which marked the extinction of the Visconti family, the Castello, which was ordered rebuilt by the famous Condottiere, Francesco Sforza, who had made himself Duke of Milan, was begun by one, Giovanni da Milano, about 1450, who was strongly influenced by Antonio Averulino, known as *il Filarete.* Under the Austrian occupation, it was converted into barracks and the building had suffered much from the usage of time. But from 1893-1911 it underwent extensive restorations, in the XV century style, from the plans of Luca Beltrami so that, as it stands today, it is a solemn and impressive work, one of the most interesting and imposing monuments of Milan.[1]

The *Ospedale Maggiore* (Plate 221), which was begun by Filarete before A. D. 1457, modified at first by Guiniforte Solari and subsequently by others is, except for the basement and columns, entirely of brick and terra cotta. Filarete who perhaps was not able, or perhaps did not know how, to overcome the very firmly rooted Gothic tradition, adhered to a transitional style. However, even in the Gothic elements and especially in

1. L. BELTRAMI: *Il Castello di Milano.*

the windows of the lower story he lavished so much ability in marvelously modeled decorations as to make of it something veritably notable.

Another original example of the transitional style at Milan is *Santa Maria delle Grazie* (Plate 222) where, along with the traditional forms of Medieval art, are seen those of the Renaissance. In 1465 it was enlarged in the apsidal parts, a work attributed not without plausible reasons to Bramante (Plate 223).[1] It is almost completely of brick and has in addition rich decorations in terra cotta such as medallions, architraves of windows, etc. (Plate 224).

In Lombardy, outside of Milan, we also find scatterd monuments of very great importance in which the persistent characters are the fusion of Gothic forms with secondary elements of the new style, such as cornices, bands, decorations, dentils, ovoli, leaves, etc., an exuberance of embellishments, especially in terra cotta, the framing of brick windows in white plaster, and the use of graffito decorations.

Among many others, we cite one of the best known, the *Certosa of Pavia* (Plate 225). Begun in 1396 by Gian Galeazzo Visconti, son and successor of the founder of the *Castello*, the work on it lasted many years and was done by a multitude of distinguished artists. Its sides and rear are entirely of brick, with the facing so carefully laid in extremely thin mortar joints that from a certain distance one seems to be in the presence of a red monolith, vivified by marble colonnettes and occasional spots of white plaster. The cloisters have their cornices and arcade spandrels beautifully decorated with natural terra cotta (Plates 226-227). The sumptuous marble façade, not seen in the illustrations, is a product of the high Renaissance. The monastery was suppressed by the Austrians in 1782 but restored to the Carthusians from 1843 to 1881. It is now a national monument.

In Piedmont also, brick architecture was very widespread. We find more outstanding the persistence of old Gothic elements that here blended more slowly with the new forms of the Renaissance, especially in the small centers. Limited space permits us to cite only the priory of *Sant' Orso* in Aosta (Plate 228).

1. L. Beltrami: *Chiesa di Santa Maria delle Grazie in Milano* (Archivio storico dell'arte, VI, p. 229.)

PLATE 228. Priory of Sant' Orso, Aosta.

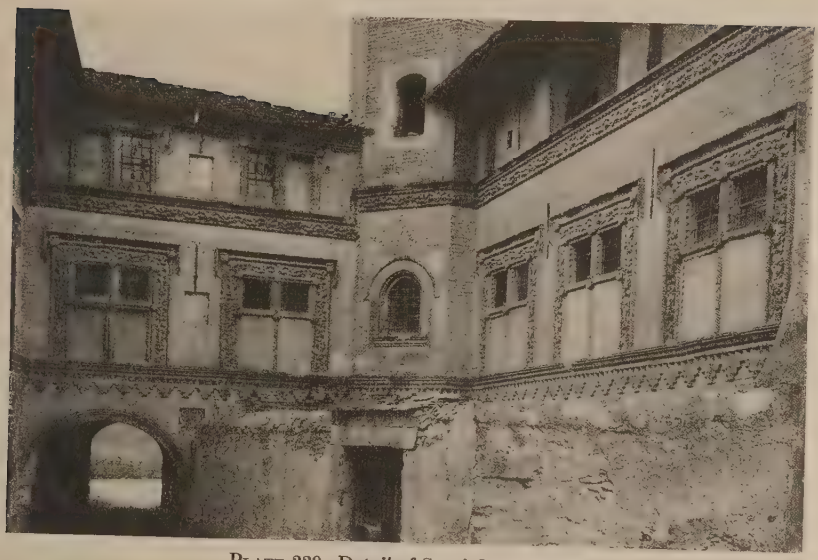

PLATE 229. Detail of Sant' Orso, Aosta.

PLATE 230. Court in House of Saint Catherine, Siena.

PLATE 231. Chapel of Palazzo dei Turchi, Siena.

PLATE 232. Tower of the Palazzo dei Turchi, Siena.

PLATE 233. Castello delle Quattro Torri, Ivrea.

PLATE 234. The Castello, Ozegna, Piedmont.

PLATE 235. Tower and Entrance of Monte Oliveto Maggiore, near Siena.

PLATE 236. Tower of the Castello, Torrechiara, near Parma.

PLATE 237. Campanile of Santo Spirito, Rome.

PLATE 238. Portico of the Hospital of Santo Spirito, Rome.

Here, to the windows, that timidly show themselves alongside of medieval motives, is joined an exuberant and splendid decoration in terra cotta (Plate 229).

At Siena in Tuscany, the charming little court in the House of Saint Catherine (Plate 230), attributed to Peruzzi, shows the restrained feeling of the earlier Renaissance period. The same influence is felt in the *Palazzo dei Turchi*, known popularly as the *Palazzo dei Diavoli*, of which are shown the chapel and tower (Plates 231, 232, Fig. 65). The Chapel by Ant. Federighi is regarded by Burckhardt as "a jewel of the early renaissance."

As examples of the castellated type, moving through a period of transition, may be cited the *Castello delle Quattro Torri* (Plate 233), founded by the famous Savoyard, Count Amadeus VI (*Conte Verde*), at Ivrea, Piedmont, about the middle of the XIV century; of the following century, the *Castello* at Ozegna (Plate 234), also in Piedmont, and the *Castello* at Torrechiara (Plate 236), near Parma; and, of the same type but earlier, the tower of the great Benedictine monastery of *Monte Oliveto Maggiore*, now a national monument, in the Sienese territory (Plate 235).

In Latium and Southern Italy, stone was almost always employed which, because of its abundance, was the more economic material. At Rome, especially, there was made an extensive use of materials of every sort, secured unfortunately by the demolition of ancient monuments, a fact really extraordinary when it is remembered with how much devotion these monuments were drawn and studied by the very same artists who were not ashamed afterwards to turn them into quarries of stone and marble, something for which this and following periods were sadly

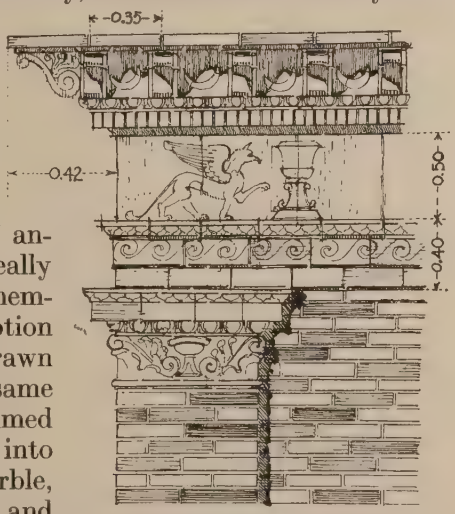

FIG. 65. Detail of Chapel Entablature, Palazzo dei Turchi, Siena.

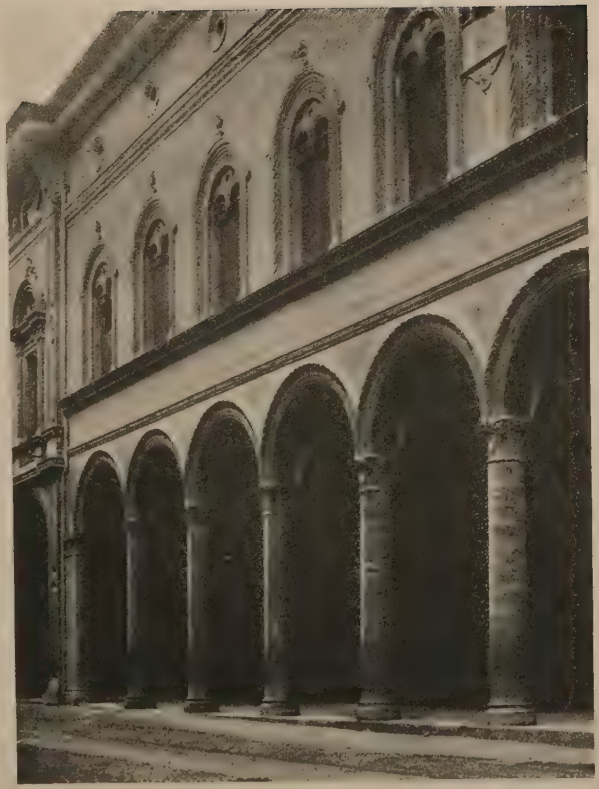

PLATE 239. The Fibbia, now Palavicini, Palace, Bologna.

PLATE 240. The Bolognini Palace, Bologna.

notorious. However, we may find completely built of brick the church and companile of *Santo Spirito* (Plate 237) and the portico of the hospital of like name, sober, elegant, and of excellent workmanship (Plate 238). Their construction goes back to the pontificate of Sixtus IV (1471-84).

We close these brief notes on the First Period by recalling how the application of brick was not limited solely to the construction and decoration of edifices but was extended to all their parts, even to the most minute particulars. Of much importance were the pavements in geometrical designs, laid with brick of various colors, for the most part red and yellow, and roof ridges, which assumed a rather considerable artistic importance, especially as seen in Venetia and the Emilia.

Renaissance, Period II

This period is characterized, as is well known, by a constantly increasing approach of architecture to the ancient models of classic art. The artists, attracted by the singular fascination of the Roman monuments, devoted themselves with loving care to their study and to the reproduction of their forms.

Such approach, initiated in the XV century and at first connected with local traditions, was not only widely extended but, in all parts of Italy, gradually focused itself in a body of uniform principles. Having become a true style, it was afterwards reduced to formulas—which often enough in the beginning artists disregarded—until, at a time when there was less inspiration and originality, it hardened into various treatises on the subject, so that only a few architects of merit were able to withdraw from its deadening influence. The economic and social conditions, the elevation of the various forms of civic life, and in fact all the conditions peculiar to this period[1] permitted and encouraged the employment of the most opulent resources in building. A sort of grandiosity is substituted for the refinement and harmony of the preceding period; and in the end the forms of the new style caused chiefly the use of stone and marble in the embellishment of buildings, also enriched by

1. Burckhardt: *Die Renaissance in Italien.*

PLATE 241. Oratorio of Cristo Risorto, Cremona.

PLATE 242. Castle of Moncalieri, Piedmont.

PLATE 243. Church of the Beata Vergine del Soccorso, Rovigo.

PLATE 244. The Ponte Romano, Cesena.

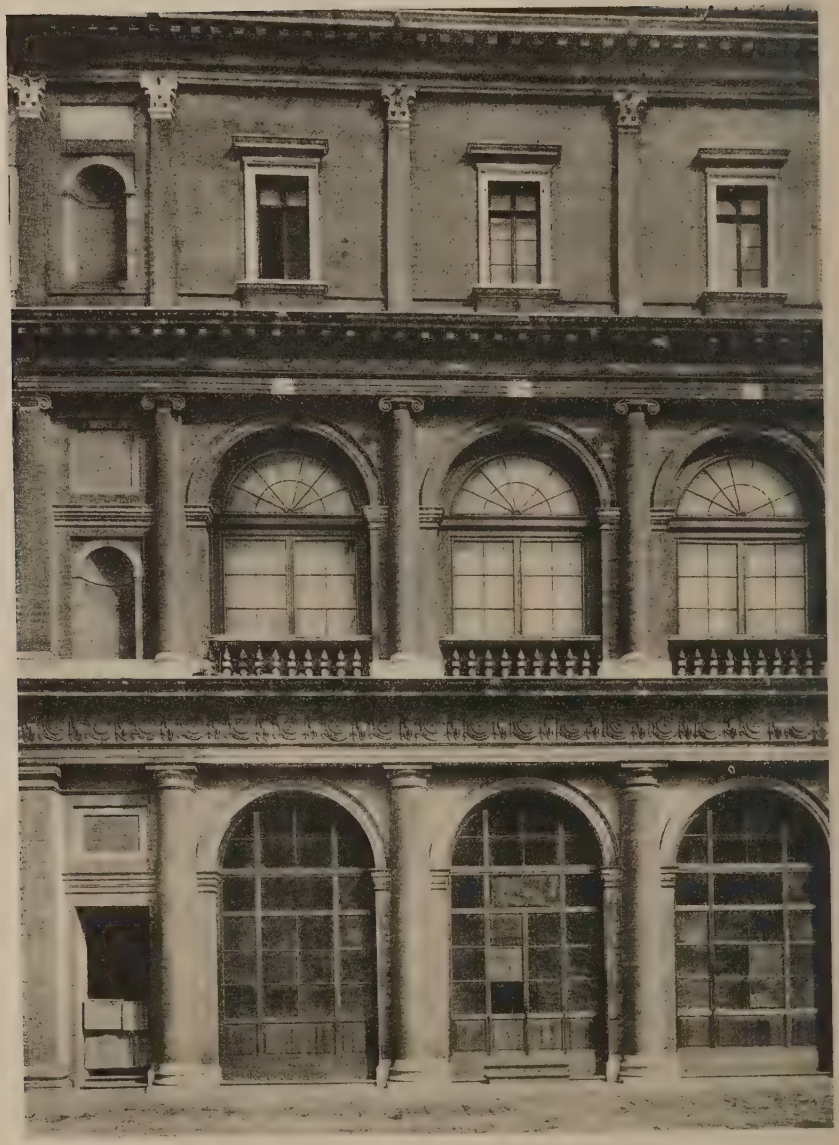

PLATE 245. School of Santa Maria della Carità, now Institute of Fine Arts, Venice.

PLATE 246. Santa Maria degli Angeli, near Assisi.

PLATE 247. Santa Maria delle Vergini, Macerata.

the use of stucco which was to take on so great a development in the subsequent Baroque manner.

In consequence of all this, brick as a decorative material, was reduced to a very low estate and lost its importance. The real organic expressions of brick architecture became constantly rarer, to the point of disappearing altogether, and finally when it was employed at all, it was almost exclusively used to imitate forms characteristic of stone. However, a logical use of it was made in wall facings, pilasters, and piers, which are found almost everywhere. It was also largely employed in minor elevations of buildings and in general in all those parts of less importance, such as belvederes, gables, small campaniles, and the like.

In numerous and excellent monuments of this period, brick, as already said, lost its predominance. Even at Bologna, a very important center of brick architecture, stone entered to a large degree into construction. The Fibbia Palace, now Pallavicini (Plate 239), which still felt the influence of the XV century, presented forms suitable for marble but were executed in brick, especially in the cornices of the crown. More characteristic is the Bolognini Palace (Plate 240) which, although conserving the Bolognese type, is distinguished in its forms from the preceding period. Begun in 1526 and continued

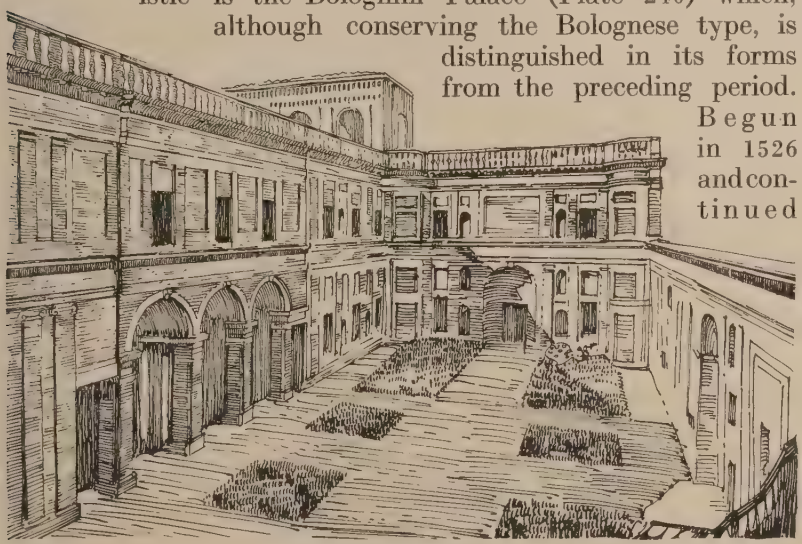

Fig. 66. Detail of the Villa Imperiale, near Pesaro.

in 1602, it shows splendid decorations in terra cotta by A. Lombardi. Later in the XVI century, when brick was employed only for the facing of external walls, it is seen how brick had lost its dominance in Bologna itself.

In Upper Italy, we note the octagonal Chapel of *Cristo Risorto*, adjoining *San Luca* at Cremona, which was constructed about A. D. 1503 and attributed to Bramante (Plate 241), a veritable jewel of brick architecture where the brick exactly follow forms of stone, even in the attractive little columns of the two-light windows. At Rovigo is also found a noteworthy octagonal structure in the Church of the *Beata Vergine del Soccorso*, or the *Rotonda*, (Plate 243) by Francesco Zamberlan, a pupil of Palladio, built about 1594. The beautiful campanile in the rear was designed by Baldassarre Longhena a half century later. At Venice, of especial interest is the School of *Santa Maria della Carità*, by Palladio (Plate 245), an assembly place for a corporation of the arts and crafts and at the same time a school of art and a religious association house. Of similar schools, of which Venice had as many as twenty-five (some of them of the greatest renown, due to the genius of the Lombardi and of Sansovino), this one by Palladio is for us the most interesting, in view of the large employment of brick. However, even here, it is well to note that the imposing forms of the classic orders, which lend themselves ill to the use of brick, are in some parts executed in stone. Finally, there are not wanting works of public utility, very important among which is the *Ponte Romano* over the Savio at Cesena (Plate 244), constructed by Pietro Borbini

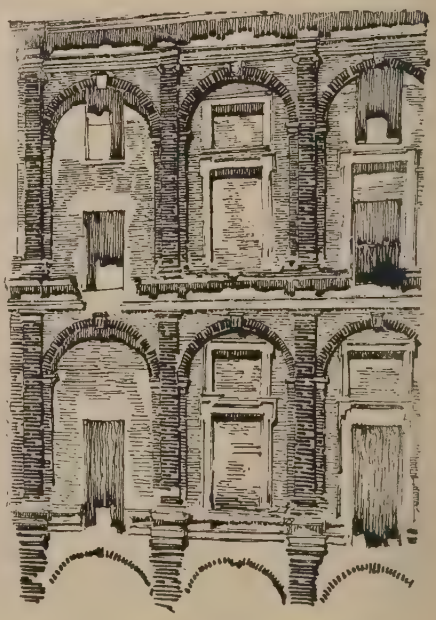

FIG. 67. Detail of Giordino Palace, Pesaro.

of Milan, under the pontificate of Clement XIII (1758-69) and which, although of simple form and free from all decoration, indeed useless in a work of such kind, may be said to be a genuine expression of architecture in brick, employed with fine judgment and wise discernment. In Piedmont, as an example of the late Renaissance, may be cited the Castle of *Moncalieri* near Turin, now a royal residence, originally built in the XV century but reconstructed in the XVII (Plate 242).

In Central and Southern Italy, we find brick employed on the same principles we have already examined. That is, under the decorative point of view, it became a material of secondary importance. As usual, a very wide use of it was made in the facing of walls which are scattered everywhere and very excellently done as, for example, the brick facing of the Farnese Palace at Rome which is executed with such care as to be mistaken for stone. The Church of *Santa Maria degli Angeli* at Assisi (Plate 246) has a part of the façade, the sides, the apse, and the campanile done almost entirely in brick. Here also brick is used on constructive principles, and stops with the cornices. However, especially in the lower zone, the architrave, the frieze, and even the triglyphs of the Tuscan order are in brick. In the Marches, the tradition of brick building continued. From among numerous examples we cite, because of its size and constructive importance, the Church of *Santa Maria delle Vergini* at Macerata, with a Bramantesque flavor, which is especially notable for its daring cupola, decorated with an Ionic order completely of brick (Plate 247).

Near Pesaro the *Villa Imperiale* is worthy of note (Fig. 66). The upper court shown here gives some idea of a splendid brick structure of the period. It was built by Girolamo Genga, architect of the ducal family, at the order of Eleonora Gonzaga for her husband, Francesco Maria I, Duke of Urbino, during the first half of the XVI century. Another example at Pesaro is seen in the fine arcaded wall at the rear of the *Palazzo Giordino* (Fig. 67).

At Rome, we mention in passing the Church and the Campanile of *Santa Maria dell'Anima*, where the use of brick has no great importance, but we wish to note especially the Church of

PLATE 248. Santa Maria di Loreto and Trajan's Column, Rome.

PLATE 249. Campanile of Santa Maria di Loreto, Rome.

Plate 250. The Collegio Romano, Rome

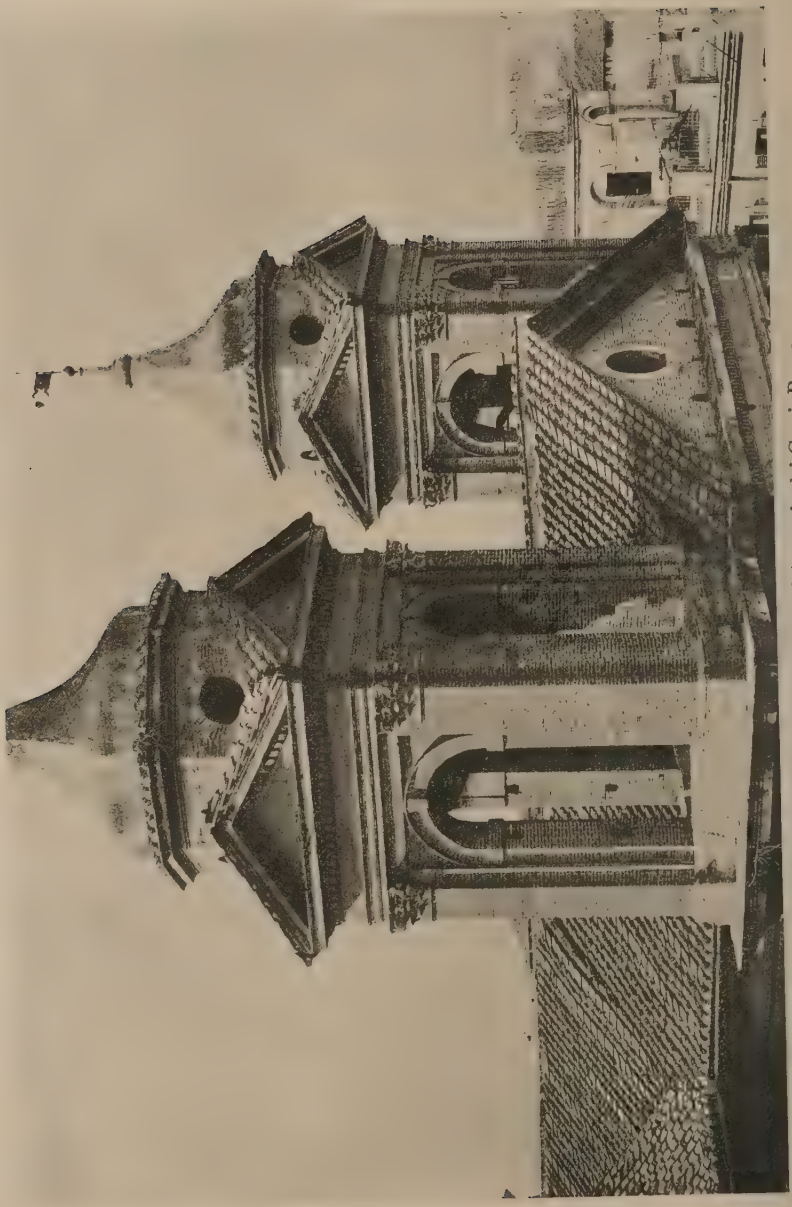

PLATE 251. Campanili of Sant' Atanasio dei Greci, Rome.

PLATE 252. Carignano Palace, Turin.

PLATE 253. Academy of Science, Turin.

Santa Maria di Loreto, begun by Giuliano da Sangallo in 1507 (Plate 248). The small lateral campanile has special interest for us not only because of its very pleasing composition, but for the brickwork in the great brackets, the cornices, and even the architraves of the windows (Plate 249). The portal and lantern on the dome were added by Giovanni del Duca in 1580. Finally, a work which is essentially brick and very much larger and more interesting than the others named, is the Palace of the *Collegio Romano* (Plate 250), constructed about 1582 by Bartholomeo Ammannati at the charge of Pope Gregory XIII (1572-85). Original and imposing, although a little cold, it presents no special details of interest in its brickwork, but it is nevertheless for us one of the major brick edifices of this period. Among minor parts of buildings in which brick was more largely adopted we cite, as a typical example, the two small campaniles of the Church of *Sant' Atanasio dei Greci* (Plate 251), designed by Martino Longhi il Vecchio, at the close of the XVI century.

The Baroque and the Eighteenth Century

These last periods, as is known, were characterized by a lowering of classical taste, a breaking up of ancient traditions, and a lack of feeling for simplicity, purity, and organic unity. Every artist worked according to his individual inclination, and followed wherever his unbridled fantasy led him.

Each busied himself with details and labored to make the small appear great. No longer is there seen purity of line and exact proportion, but everywhere lace-like traceries, projections, curves, ornaments of every kind, to such an extent as to make evident how far the spirit of the decorator had prevailed over that of the architect. This much premised, it may easily be understood how difficult, if not impossible, it was to execute in brick all the whimsicalities which the mind of the artist could conceive, bizarraries which sometimes became a veritable confused heap of fantastic exaggerations in which the lines of the structure were lost and the eye found no repose.

Besides, the technique of stucco, which was extraordinarily advanced, not only supplied the demand of the new architec-

ture and adapted itself to it in a perfect manner, but took almost completely the place of brick in decoration.

In examples of brick architecture, we see that, as a matter of fact, decoration taken as an organic expression of constructive forms has disappeared. Brick was compelled by numberless strokes of the hammer to follow the curves and the traceries of stucco. We find a typical example of this kind of work greatly accentuated in the façade of the *Palazzo Carignano* at Turin (Plate 252), built about 1680 by G. B. Guarini. Victor Emmanuel II was born here, and for a time (1861-64) it was occupied by the Italian Parliament. It is now the Museum of Natural History. The contorted architraves of the windows, the ornaments, the gable, and all the decorations in general are indeed of brick, but they do not have its character and clearly reveal to what point the unregulated fantasy of the architect and the skill of the artisan may go. Less accentuated in detail, the beautiful *Palazzo dell' Accademia delle Scienze*, by the same architect, is worthy of note (Plate 253).

But these are not the sole examples. We find numerous others at Turin, Mondovi, Asti, Alessandria, where the brick is worked in a manner to simulate stucco, even invading the interior of the edifice, as for example the vestibules of the Royal Palace of Alessandria. Other monuments which present the same characters, less accentuated perhaps, are among many others the cupola of the Church of *San Giovanni* at Turin by Juvara (Plate 254), and the Cathedral of Carignano (Plate 255), a very rich and imposing example because of the proportion and harmony of its masses.

PLATE 254. Cupola of San Giovanni, Turin.

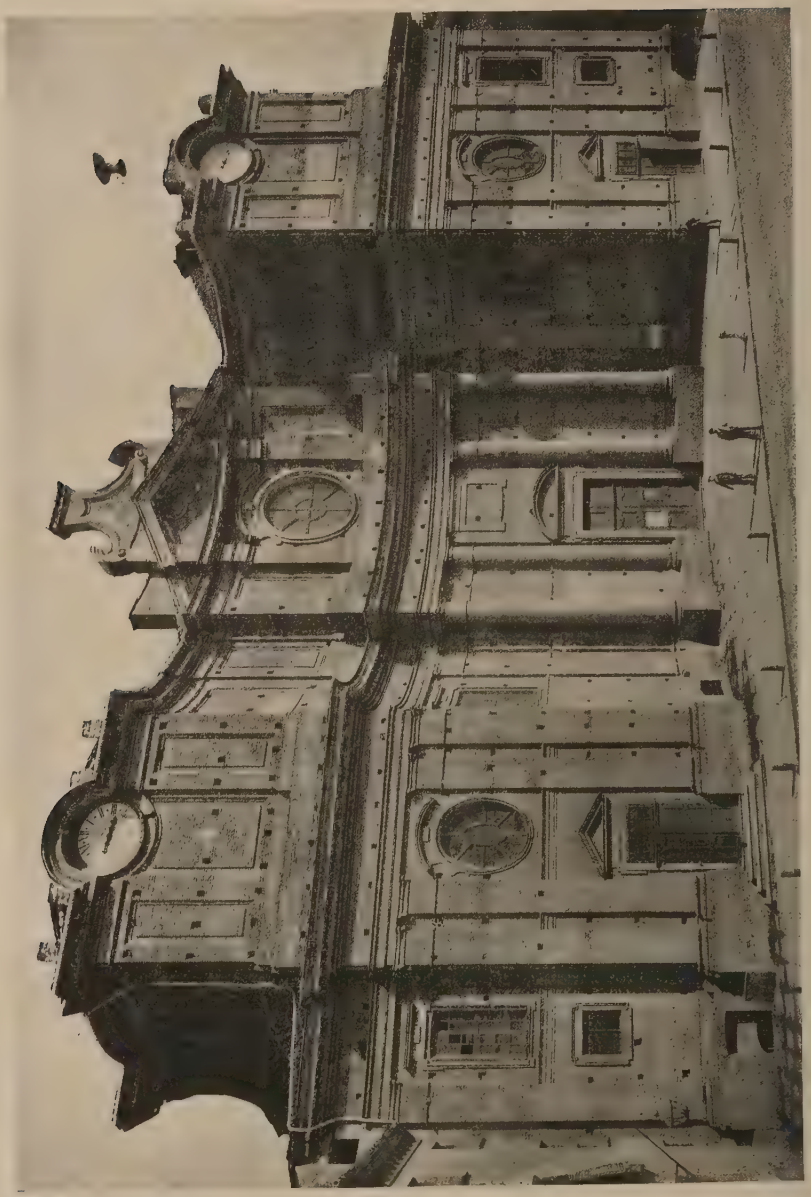

PLATE 255. The Cathedral, Carignano.

PLATE 256. Cloister of San Michele in Bosco, Bologna.

PLATE 257. Side Chapel with Apse, San Domenico, Bologna.

There may be mentioned also the campanile of the Cathedral of Saluzzo and the outside stairway of the Castle of Vinovo offering a truly scenic effect.

At Bologna, we find worthy of note the octagonal cloister of *San Michele in Bosco*, built in 1602 by Pietro Fiorini and Guglielmo Conti (Plate 256); also the side chapel with apse (Plate 257), and later the rear and cupola, of the church of *San Domenico* by Carlo Francesco Dotti (1720). The latter, in its severe lines with rectangular panels between the various orders of pilasters (Plate 258), constitutes a typical example of XVIII century architecture, where we find a return to a more quiet and scholastic charm after the frenzy of the Baroque period.

The Cathedral at Carpi (Plate 259) was begun by Alberto Pio in 1504, after designs of Peruzzi, but finished much later. We note especially its daring cupola which rises above the crossing of the nave, the decorative details of the great windows in the drum, and the three-light windows of the side naves.

More worthy of attention is the Church of *Santa Maria del Quartiere* at Parma (Plate 260), not only for its solution of the static problem but still more for its decorations, completely in brick, with characteristic multiple rectangles, the windows with broken pediments, the great volutes, and the slender campanile. Begun in 1604 by G. B. Aleotti d'Argenta, in association with G. B. Magnani, it was completed by Pietro Righini in 1700. Also at Parma, we find the very beautiful Church of *Santissima Annunziata* by G. B. Fornovo (Plate 261). With an elliptical plan, over which rises a cupola by Rinaldi, its appearance is much enlivened by the buttresses ornamented with engaged brick columns and pilasters, by the chapels with their charming blind arcades which entirely surround the church, and by a general decorative scheme which maintains an effect at once sober and imposing. Still at Parma, we ought to mention the Farnese Theater by G. B. Aleotti d' Argenta (Plate 262) which in its severe lines is sufficiently enlivened and ornamented by the simple expedient of multiple rectangles and panels.

At Rome, where the Baroque Period and the following XVIII century reached their culmination, with Bernini, Borromini, and all the other great artists of this time lavishing the inexhaustible treasures of their genius, there are not wanting good

PLATE 258. Apse and Cupola of San Domenico, Bologna.

PLATE 259. Side and Tower of the Cathedral, Carpi.

PLATE 260. Santa Maria del Quartiere, Parma.

PLATE 261. Santissima Annunziata, Parma.

PLATE 262. Theatre Farnese, Parma.

examples of brick architecture, although not very frequent. We find brick employed according to the general methods previously indicated as, among many other examples, in the sides and cupola of *Sant' Andrea della Valle*[1] (Plate 263), and in the façade of *Santa Maria dell' Orto* (Plate 264), added to the older church in the middle of the XVII century.

However, more important examples are not wanting. From the cold and reserved façade of the Church of *Sant' Anastasia* (Plate 265), rebuilt by order of Urban VIII in 1636 by Luigi Arrigucci, the chaste front of the *Collegio di Propaganda Fide* by Bernini (Plate 266), and the Oratory and Clock Tower of the *Filippini* (Plate 267) by Francesco Borromini, we come to the facade of the Convent of the *Filippini* (Plate 269), now occupied by various civic tribunals and a library, where we pause astounded at the thought of how the fantasy of an archi-

1. SERGIO ORTOLANI: *Sant' Andrea della Valle.*

PLATE 263. Detail of Sant' Andrea della Valle, Rome.

PLATE 264. Facade of Santa Maria dell' Orto, Rome.

PLATE 265. Sant' Anastasia, Rome.

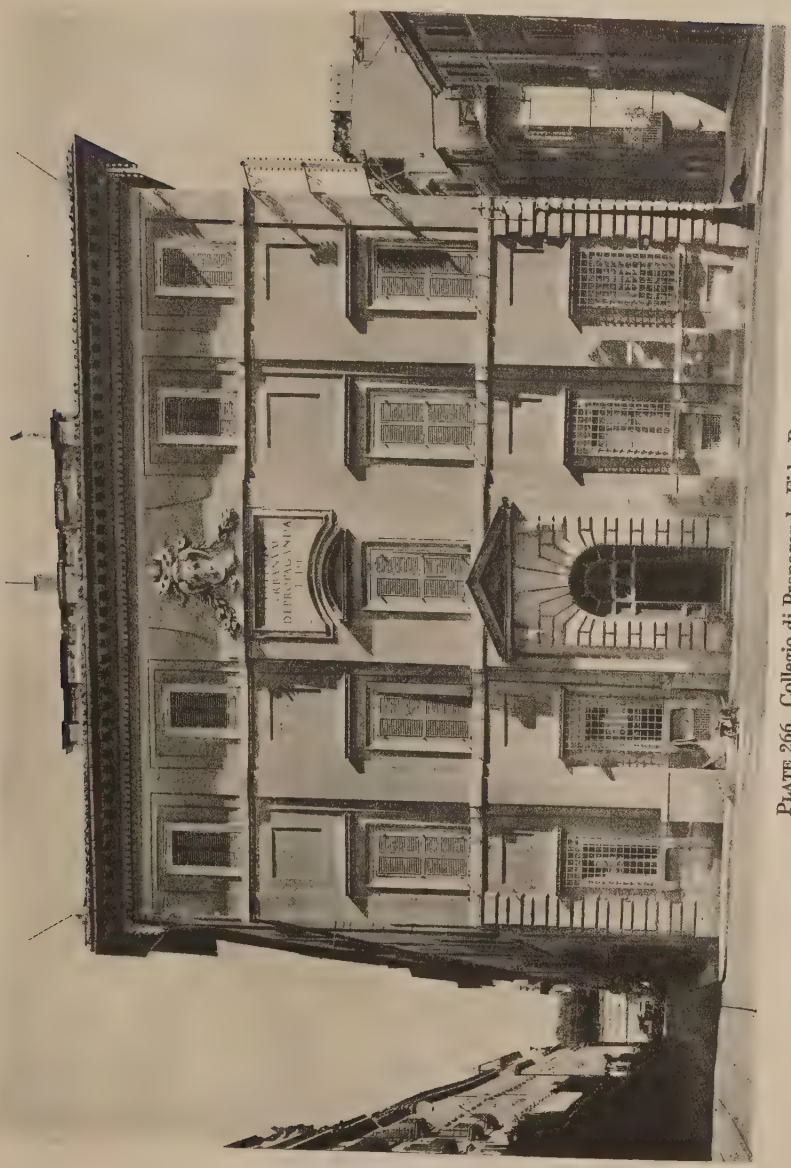

PLATE 266. Collegio di Propoganda Fide, Rome.

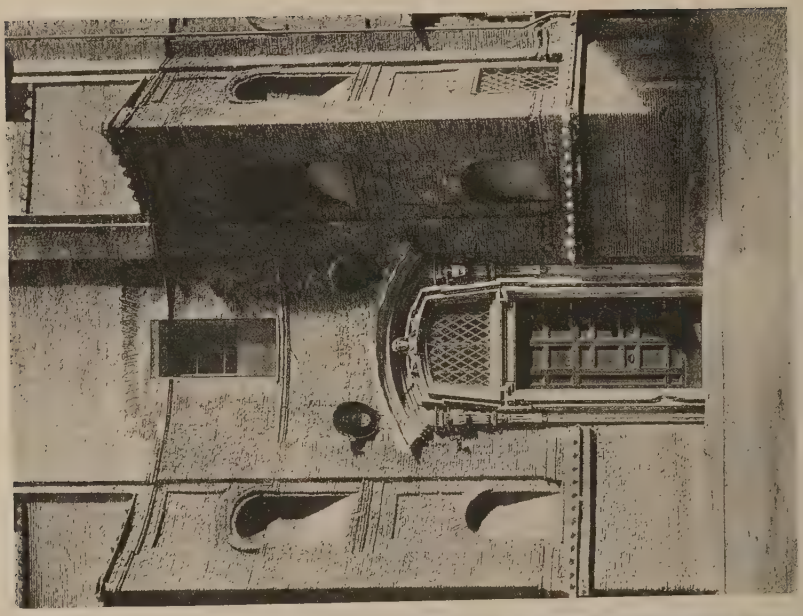

PLATE 268. Oratory of the Seven Sorrows, Rome.

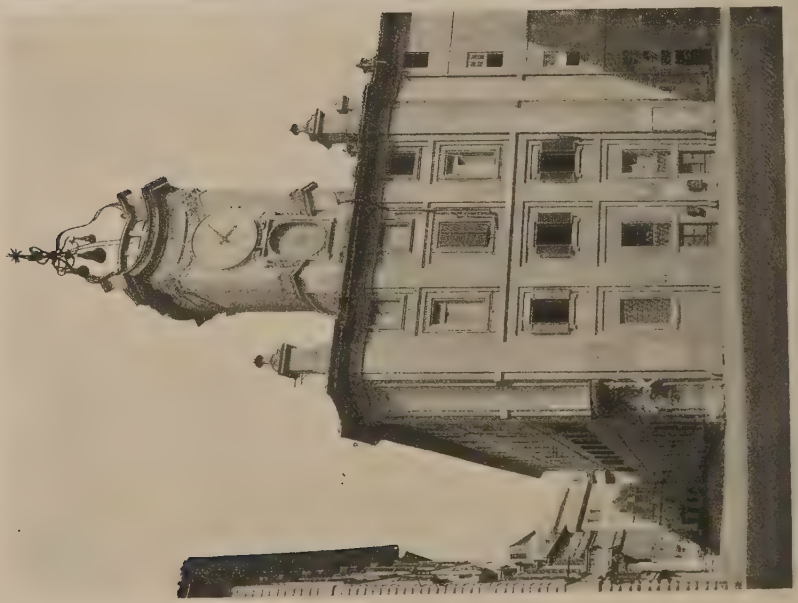

PLATE 267. Oratory of the Filippini, Rome.

PLATE 269. Convent of the Filippini, Rome.

PLATE 270. Sant' Andrea delle Fratte, Rome.

PLATE 271. Della Robbias and Arch in Casa Zanirati, Ferrara.

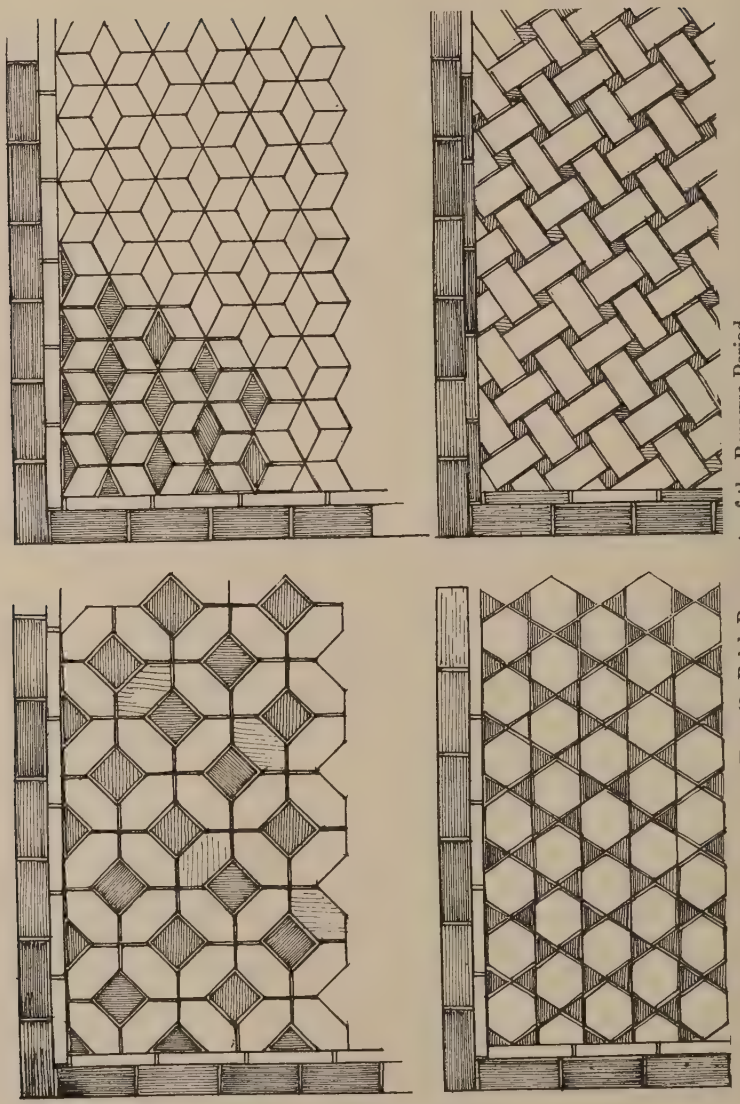

Fig. 68. Brick Pavements of the Baroque Period.

tect could reach so far and where undoubtedly, at the same time, something singularly harmonious rises before us. It is the genius of Borromini, his method of construction, his absolute mastery of all the resources of art and technique which forces the material to obey his extravagances and infinite caprices. We find the strangeness of his style also in the Oratory of the Seven Sorrows (Plate 268) and in the campanile of *Sant' Andrea delle Fratte* (Plate 270) where the brick is compelled to follow every sort of line, straight, concave, convex, twisted, and broken, resulting in a daring construction which is veritably admirable and imposing.

If terra cotta properly belonged to our theme, here would be the place to introduce an account of its marvelous development and application during this period. Facility in technique and manufacture resulted in bringing it, at this time, into great favor throughout Italy. The most capable artists did not shrink from applying themselves to this branch of art and dedicated to it their genius. Throughout an entire century the celebrated Della Robbia family reigned supreme in this art, leaving behind masterpieces never before seen and never since surpassed. Of many such possible examples we give in Plate 271 two pieces by Luca and Andrea della Robbia, and the detail of a portal in the *Casa Zanirati* at Ferrara. In the Baroque period, terra cotta rapidly fell into decline until it disappeared altogether. Stucco, the technique of which had made rapid progress, supplanted it and invaded every space, lending itself better to the exigencies of the new style and the taste of the new age.

In closing our brief review of the Renaissance, Baroque, and XVIII Century periods, we cite a very interesting application of brick to pavements in which it was generally employed, attaining a refinement and elegance never seen in earlier periods. For this purpose, brick were manufactured of every type and form in buff and red tones which, skilfully combined and set, produced motives almost always geometrical and of surprising effects. Examples are numberless, and very beautiful (Fig. 68). We present only a few to give an idea of their form and variety.

Prof. Ing. Carlo Roccatelli

BRICK IN MODERN ITALY

Manufacture

It may be said that wherever good deposits of clay are found in Italy, brick are made. These clays differ all the way from the purest, white burning clays, fusing at 1500° Centigrade [2732° F.], used for refractories and pottery, to those burning the most varied colors by reason of ferruginous, calcareous, or organic impurities contained in them. The iron oxide in clays imparts a yellow or red color in burning, which becomes deeper with the extent of the burn, while lime in the clays produces the lighter buff and cream shades in the finished product. The best clay banks abound in Piedmont, Lombardy, Venetia, and the Emilia, the quality of the material being exceptional for purity and plasticity in the valley of the Po. Sand is the most widely used material for reducing the clays, if necessary, to the proper consistency, the sand nearly always being found in convenient deposits near the clay pits. In Latium the clay and sand are sometimes found in alternate strata. Crushed brick is also used for reduction, rarely sawdust and coal screenings. The clay is never mined but won from the surface after stripping, or dug from open pits. The old practice of winter tempering is not so extensive as formerly, its place being taken in certain plants of Southern Italy by exposing the clay to the sun during the summer.

Some brick factories have tried the dry process method of manufacture but found it too expensive. Where machinery is used, the soft or stiff mud process is well nigh universal. The most widespread method of manufacture, however, is by hand. Not over 30 per cent of all the plants use machinery, most of the latter working the entire year, some of them producing as many as 5,000,000 pieces of brick and tile during that time. There are Italian manufacturers of clayworking machinery that successfully compete with the best foreign makes. This machinery is used for the most part in the industrial centers of Central and Northern Italy. The hand made process is quite general throughout the innumerable small plants in Campania, Apulia, Basilicata, Calabria, and Sicily, where brick factories using machinery are rare.

The six months from April to September, depending somewhat on the region, are employed in working the clay and moulding the brick. In plants working throughout the year, double the kiln quota is made during the open season to provide for winter burning. In most Italian plants, drying is natural, as the climate is favorable for such a method; it is only in special cases where artificial drying is resorted to.

Aside from the very general use of temporary or scove kilns in the smaller plants, the continuous Hoffman kiln is the only one used, provided with tall chimneys to secure a natural draught, except in seismic zones where the Prat chimney is adopted. The fuel used is powdered coal to which, for economy, lignite is added, and in Central Italy, the residue of olive presses.

Dimensions of brick in Italy vary with the locality and almost with the manufacturer, as there are no recognized standard sizes. But by custom and tradition the sizes of brick, both face and common run about 4-6 cm. [1.6-2.4 in.] in thickness, 22-28 cm. [8.7-11. in.] in length, and 11-13 cm. [4.3-5.2 in.] in width.* Various shapes are made such as radial brick for columns, especially in the Emilia, but brick are often tooled to simple forms on the job. Plants making natural decorative terra cotta are rare, perhaps because of the enormous demand for the ordinary forms in the exceptional revival of building activity the last few years, the decadence in the minor arts, or the disinclination of industry to prepare the clay specially re-

*The Italians have a word *laterizio* which is applied to all burnt clay products such as brick, tile, and terra cotta, which they also refer to simply as *cotta*. The word *mattone* is "brick" as used by us. These *mattoni* are made solid or hollow, and are known as *comune*, common, or *facia vista*, face. This latter expression, heard in Rome, is not universally employed but instead some such term as *mattone a giorno* (to the day) *da paramano* (as adornment), etc. The old Latin word *cortina* (curtain) is much used to designate wall "facing." The word for tile is *tegolo*. There is a great variety of names for different sizes and forms of this material.

Of the use of face brick in Italy, Professor Adolfo Carena of the Royal Polytechnic School of Turin, author of *L'Industria dei Laterizi*, and many technical brochures on ceramics, says: "There is a marked tendency to extend the use of facing brick (*paramano*) in Italy at the present time (1923), a fact due not only to a recognition of better aesthetic and architectural effects, as may be seen now in many distinguished monuments of the past, but also to the not inconsiderable economic advantages derived from this form of construction which eliminates completely the cost of maintenance and repairs for plastered walls. By reason of the great alternating changes of heat and cold in our country, exterior plastered surfaces are in the average building, very liable to deteriorate and fall in fragments within a brief period of time." It is to be noted in the restorations which are now being made throughout Italy that, where the underlying brick and brickwork are of good quality, the removal of the soiled and damaged plaster or *intonaco*, so extensively used in baroccoizing old buildings, leaves a clean, dignified, and strikingly fine effect in the wall surface. [*Ed.*]

quired for terra cotta. On the other hand, almost all clay working plants produce hollow brick and tile of every type, flat or arched, used for partitions, ceilings, floors, wall coverings, base boards, gutter projections, roofing, etc. At Cremona a flat perforated tile of high quality is made running from 6-10 cm. [2.4-3.9 in.] in thickness and from 50 centimeters or 19.7 inches to 1.7 meters or 5 feet, 6.9 inches in length.

The old clay decorative floor tile have fallen into disuse and are made only for restorations of the antique, naturally at a high price; but small floor tile of conventional square, rectangular, or polygonal form and of natural color are quite generally made and used throughout the country. The square tile, 12-25 cm. [4.7-9.8 in.] is widely used.

Examples of Modern Italian Architecture

The modern period may be dated from the middle of the XVIII century when there was a very strong reaction against the Baroque, and when attempts were being made to revive the old Greek and Roman forms. There were, however, wanting artists capable of such a restoration, and with the artists there was wanting also the milieu. Cold forms were used in which the brick bore little part or were used only in the field of the walls, as in the *Palazzo Braschi* (Plate 272) designed by Cosimo Morelli, and more recently and happily in the *Palazzo Margherita*, formerly the *Palazzo Boncompagni-Piombino* and now the residence of the Queen Mother, Margherita, by Architect G. Kock (Plate 273), both in Rome.

In consequence, the most diverse ways were tried out; some would remain faithful, especially at Rome, to the classical traditions, with a limited use of brick on the score of color; sometimes they undertook to imitate medieval constructions and those of the XV century, in which brick was largely employed but in which the spirit of the builder was not always faithful to the purity of feeling dominant in those times.

Along with these imitations were found independent attempts, not always happy and rarely inspired. These attempts constantly pursued an eclecticism in which it was hardly possible to perceive an idea really corresponding to the spiritual

PLATE 272. Braschi Palace, Piazza Navona, Rome.

PLATE 273. Palazzo Margherita, Via Veneto, Rome.

PLATE 274. Villino Vitale, Rome.

PLATE 275. Villino Ferrari, Rome.

PLATE 276. Villa Salvadori, Porto San Giorgio.

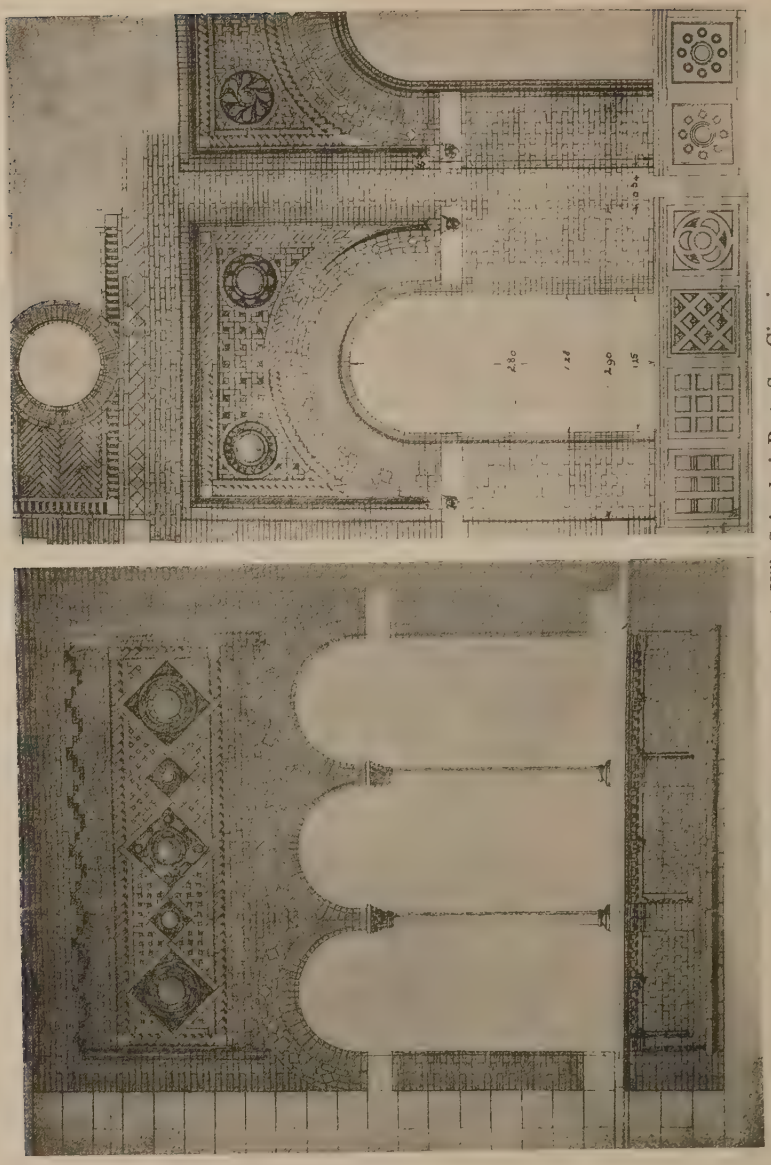

PLATE 277. Window details in Villa Salvadori, Porto San Giorgio.

and material conditions of our times and in which the idea of national independence was not always present.

Others sought to draw new elements of beauty from the free interpretation of past forms. Among these, Arturo Pazzi has obtained definite results in the *Villino Vitale** at Rome (Plate 274), in which brick and travertine are combined with excellent effects, while he secures still greater simplicity and harmony of material in the *Villino Ferrari* (Plate 275). But where Pazzi has attained the most satisfactory expression in brick architecture is in the *Villa Salvadori* at Porto San Giorgio in Abruzzo (Plate 276), where the brick pattern is carefully worked out in every detail. In it we see the most varied and carefully studied themes, recalling the charm of Bolognese motives in which, among the most graceful decorative schemes, are ingrafted forms of glazed terra cotta, as we see in the details here reproduced (Plate 277). Frequent in all this construction is the hammer stroke which also gives a touch of life to this minor work in a great variety of bonds and courses, here profusely elaborate. Every detail is studied with constant care. Of this work two chimneys (Fig. 69) afford lively expression, one of which, in an effective distribution of solids and voids, light and shade, would simulate a great masque with a large mouth pouring out smoke.

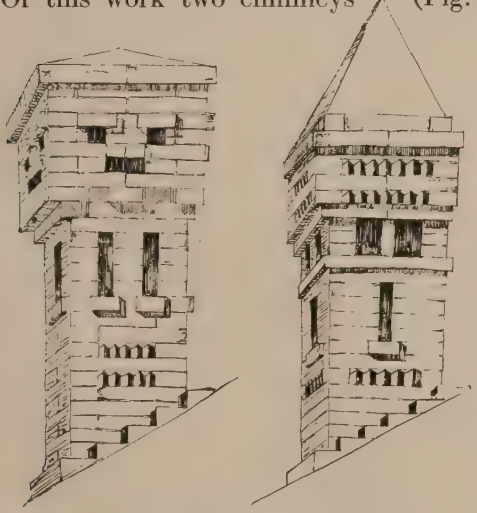

Fig. 69. Chimney Tops, Villa Salvadori.

Another careful brick construction of the same architect is the *Villino Roberti* at Rome (Plate 278) in which is admirably solved the problem of the enlargement of the chimney flues at the corners of the building.

*The word "villino" means a small villa as distinguished from the country estate with its pretentious mansion. [*Ed.*]

PLATE 278. Villino Roberti, Rome.

PLATE 279. Detail of Villa. Lungo Tevere Michelangelo, Rome.

Plate 280. Rear of the Villa Arco Scuro, Rome

Plate 281. Front of the Villa Arco Scuro, Rome

PLATE 282. Villino Salandra, Rome.

PLATE 283. Villino Sabastiani, Rome.

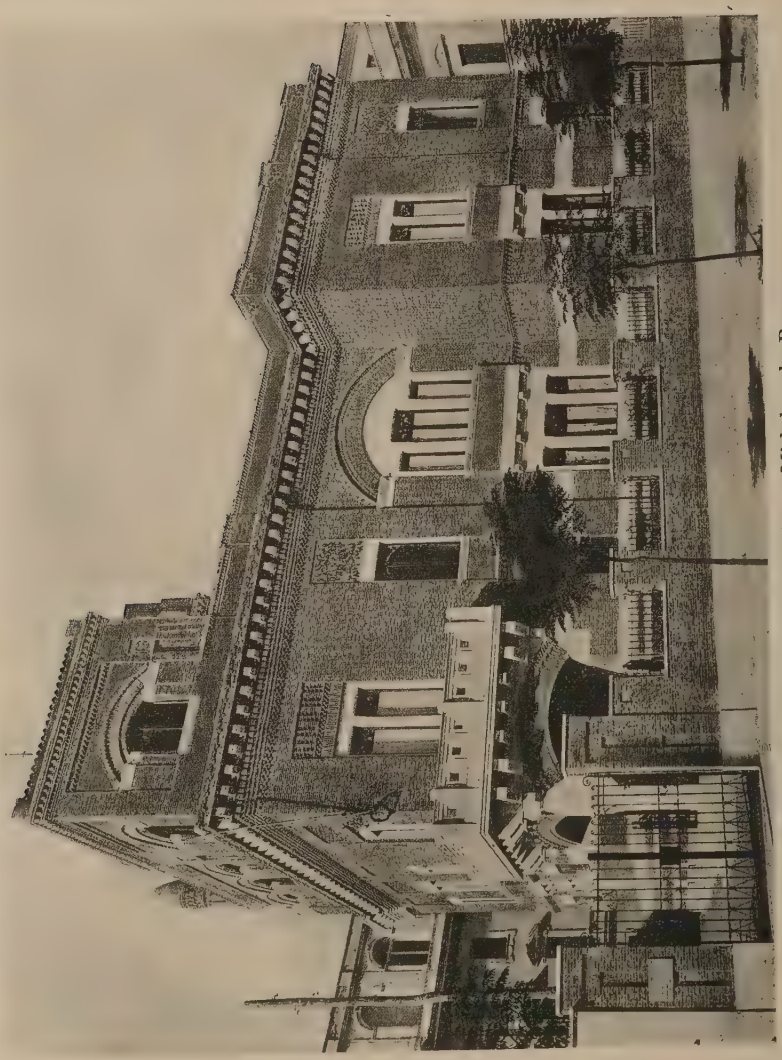

PLATE 284. Villa on the Lungo Tevere Michelangelo, Rome.

We have in other constructions at Rome a greater freedom from the forms of the past. Thus the *Villa Arco Scuro* (Plates 280, 281) attains by simple means a noble and vivacious expression, found throughout the entire construction. To be especially noted are the staggered saw-tooth courses above the windows, the treads of the outside steps laid in brick set obliquely, and the coping of the stair guards and fountain wall fronting the principal entrance.

One of the most beautiful constructions, along lines both individual and harmonious, is the *Villino Salandra* by Architect Cirilli (Plate 282), a little architectural jewel, in which natural terra cotta combined with moulded brick is used to frame the window openings with an artistic touch. Another work, which succeeds in freeing itself from the old lines, designed as an organic modern expression of notable effect, is *Villino Sabastiani* by Architect Arnaldo Foschini, reproduced in Plate 283. Some reminiscence of fragmentary Roman work is found in a house on the Lungo Tevere Michelangelo designed by Cav. Umberto Bottazzi, in association with the Roman painter Vittorio Grassi, in which a strikingly effective result has been secured by the use of very simple means (Plates 279, 284).

Other typical examples of modern brickwork at Rome that may be mentioned in passing as worthy of note are the *Villino Scialoia* (Plate 285); the *Villino Popert*, by Architect Cannizzaro (Plate 286); two *villini* in Via Alessandro Farnese, and in Via Pompeo Magno (Plates 287, 288); a Conventual School in Via Po by Architect Passarelli (Plate 289); Church and Convent of *Corpus Domini* in Via Sardegna (Plate 290); and the *Palazzo delle Assicurazioni Generali Venezia* in the Piazza Venezia (Plate 291).

In other places, we sometimes see the local traditions followed with an excessive fidelity, as at Venice, where the major part of recent architectural composition in brick cannot be distinguished from work of the XIV century, as for example the *Pescheria*, or Fish Market, by Architect Laurenti (Plate 292); the little palace Stern (Plate 293), designed by Architect Giuseppe Berti in 1910-11, and many other similar buildings both at Venice, and in its surroundings. With a pleasing pictorial feeling Marius de

PLATE 285. Villino Scialoia, Rome.

PLATE 286. Villino Popert, Rome.

PLATE 287. Villino in Via Alessandro Farnese, Rome.

PLATE 288. Villino in Via Pompeo Magno, Rome.

PLATE 289. Conventual School in Via Po, Rome.

PLATE 290. Church and Convent of Corpus Domini, Rome.

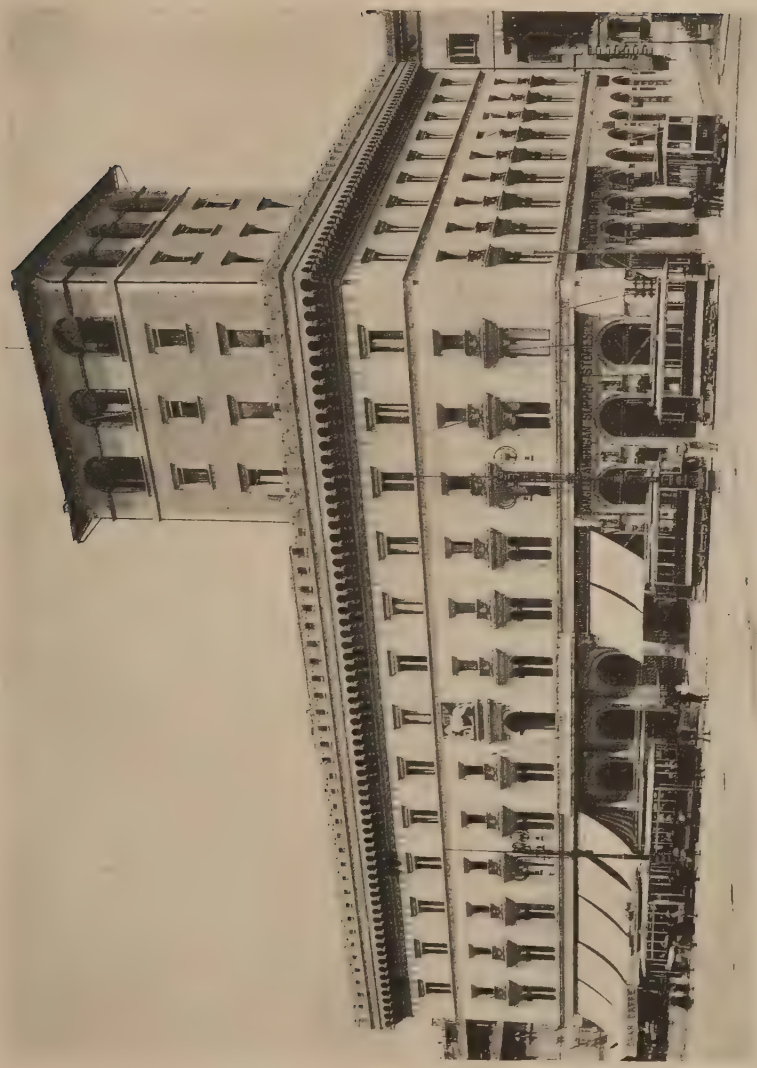

PLATE 291. Palace of the Assicurazioni Generali Venezia, Piazza di Venezia, Rome.

PLATE 292. The Fish Market on the Grand Canal, Venice.

PLATE 293. The Stern Palace, Venice.

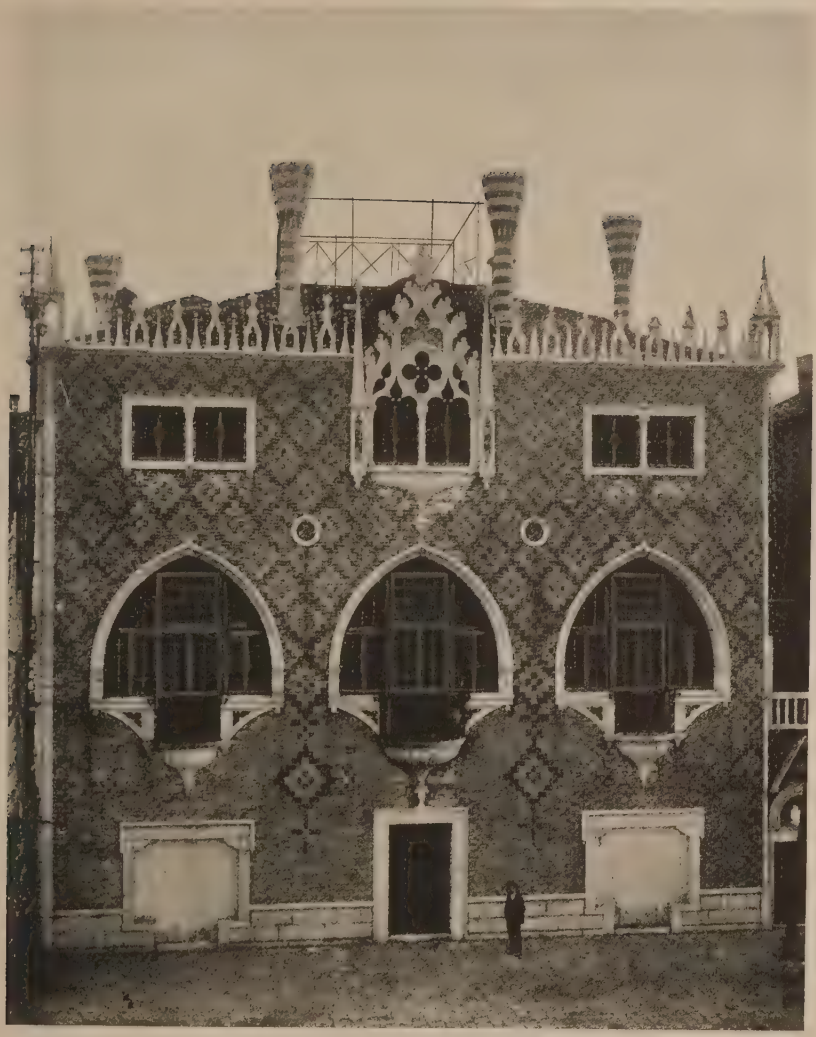

PLATE 294. Palazzina alla Giudecca, Venice.

PLATE 295. Casa Zucchini, Bologna.

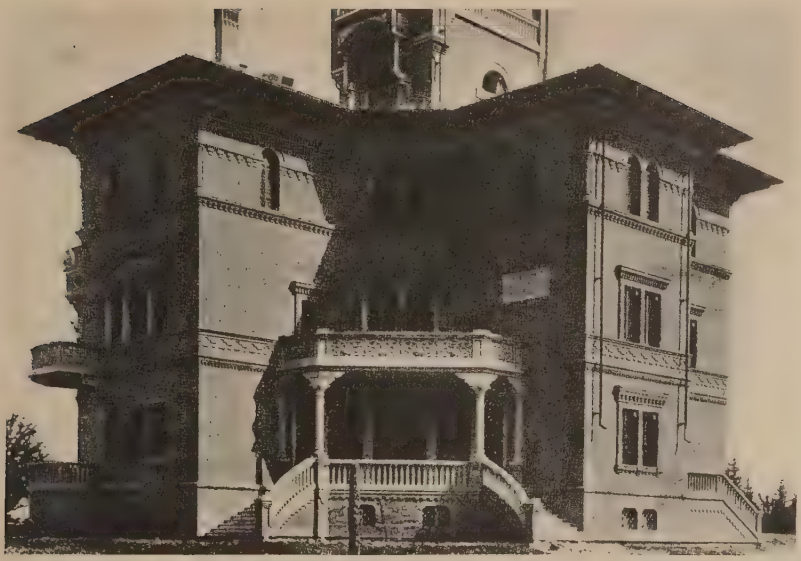

PLATE 296. Country House near Modena.

Maria frees himself from this sort of work, which has almost the fidelity of tracings over medieval forms, in a sprightly little palace on the Giudecca in which the field of the wall is done in a beautiful facing of yellow and red brick of a purely local character (Plate 294).

Bologna at times scrupulously respects the environment by reconstructing XV century houses in brick of an intense red color, with beautiful terra cotta decorations, such as the *Casa Zucchini* (Plate 295) and innumerable others. Frequently, however, in most recent years, there is a detachment from the traditional architecture, but not always with happy effects.

Near Modena, we see a beautiful small villa in which the XV century architecture is interpreted in a freer manner (Plate 296). The architect, Pietro Carini, has been able to draw a great variety of effects from hints and suggestions found in Tuscan motives, by adapting the resources of modern technique to decorations in artificial granite dressed by the hammer. The pleasing little house with a communal school at Cisano near Brescia, seen in Plate 297, shows simple lines and a sprightly

PLATE 297. Communal School, Cisano.

movement. Of the attractive group of small country houses, shown in Plates 298 to 300, the first is at Imola, near Bologna. Built of a beautiful pinkish cream brick, it is an example of the small suburban residence frequently found in central and northern Italy. The three other charming little houses are at Ferrara, the last of which shows a decidedly English influence.

Before concluding these hints on modern domestic brick architecture, we recall the expression of a decadent romantic sentiment which loved to loiter amid the verdure of Tuscan and Lombard fields, exemplified by a small pavilion and tower (Plate 301) in the Royal Villa at Monza, now used as a library and museum.

PLATE 298. Small House at Imola.

PLATE 299. Small House at Ferrara.

PLATE 300. Other Examples of Small Houses at Ferrara.

PLATE 301. Library and Museum in Royal Villa at Monza.

SACRED ARCHITECTURE

Sacred architecture is expressed in brick by often turning back to medieval forms. After this manner, Architect Tullio Passarelli built in Rome the charming little *Chiesa del Divino Cuore* (Church of the Sacred Heart), with an annexed monastery (Plates 302, 303), and shortly afterwards, in the year 1900, the more ambitious church of *Santa Teresa* in the Corso d'Italia (Plate 304). Here we have the simplest Romanesque motive in a façade, worked out almost to the point of bareness but broken and enlivened by a pleasing line of pendent arches in the gable and an open arcaded gallery above the portal. The brickwork which is of a delicate pinkish red is admirably done. Still later Passarelli designed the Church of *San Camillo* in the Via Piemonte (Plates 305, 306), a notable red mass in the midst of modern Roman construction, the exterior of which clearly reveals the organic structure of the nave and aisles. Upon piers extending from side aisles, the buttresses meet the thrust of the vault of the central nave. The flying buttresses consist of three small arches resting upon columns. The lines of the eaves are followed

PLATE 302. Church of the Sacred Heart, Rome.

PLATE 303. Side and Rear of the Church of the Sacred Heart, Rome.

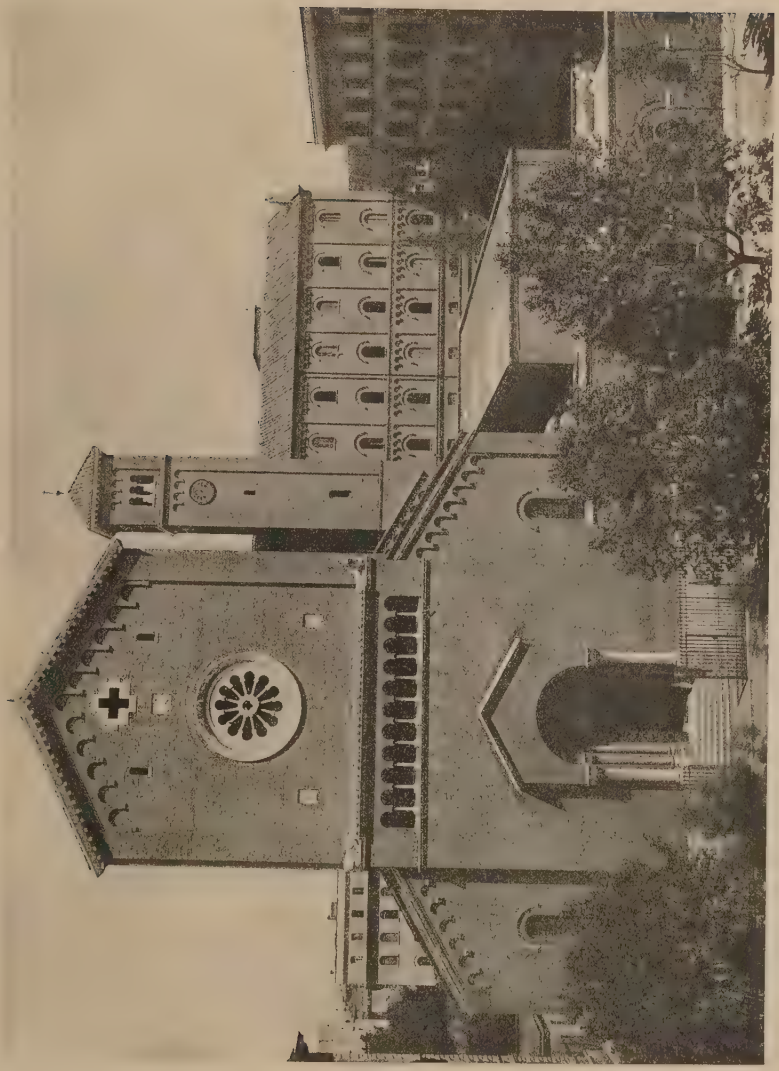

PLATE 304. Church of Santa Teresa, Rome.

PLATE 305. San Camillo, Rome.

PLATE 306. Side and Tower of San Camillo, Rome.

PLATE 307. Church of the Holy Family, Ancona.

PLATE 308. English Church of All Saints, Rome.

by brick cornices in sawtooth and small brackets of cut stone. Architect Mario Ceradini was inspired by the same Romanesque sources in designing the *Chiesa della Santa Famiglia* at Ancona (Plate 307), in the façade of which there is imposed a greater decorative task upon the brick. Though not by an Italian architect, the English Church of All Saints in the Via Babuino, Rome, as a pleasing example of the Gothic revival, designed by the eminent English architect, George Edmund Street, is worthy of note (Plate 308). The interior especially illustrates the admirable way in which brick may be used in ecclesiastical work (Plate 309).

But the most beautiful brick design executed in recent years in ecclesiastical architecture is the *Church of the Sacred Heart* at Bologna (Plate 310), due to Edoardo Collamarini.

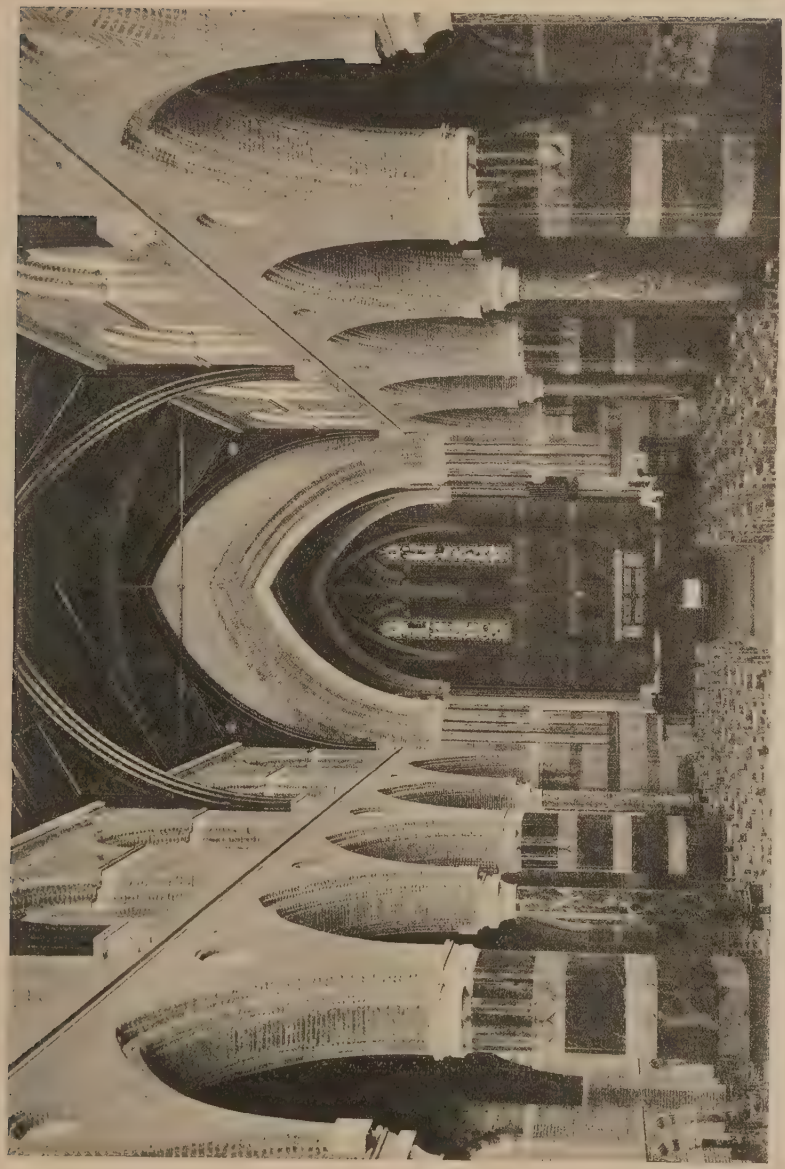

PLATE 309. Interior of All Saints, Rome.

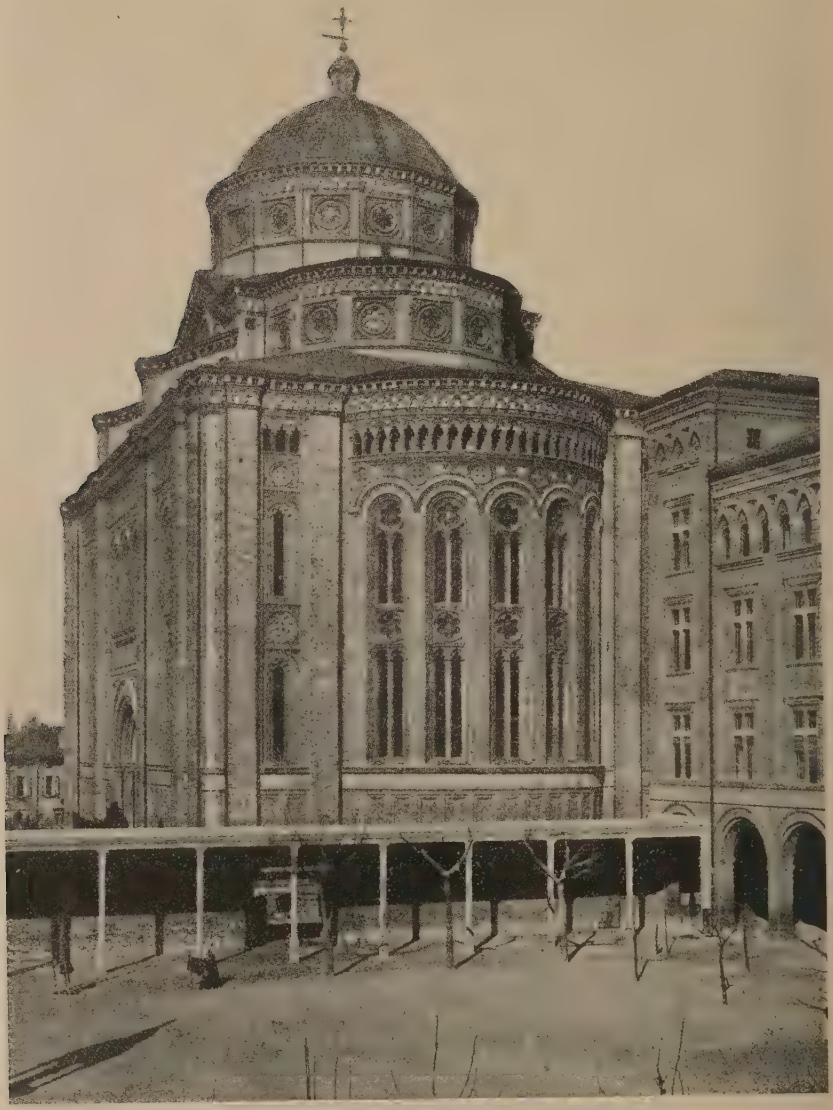

PLATE 310. Church of the Sacred Heart, Bologna.

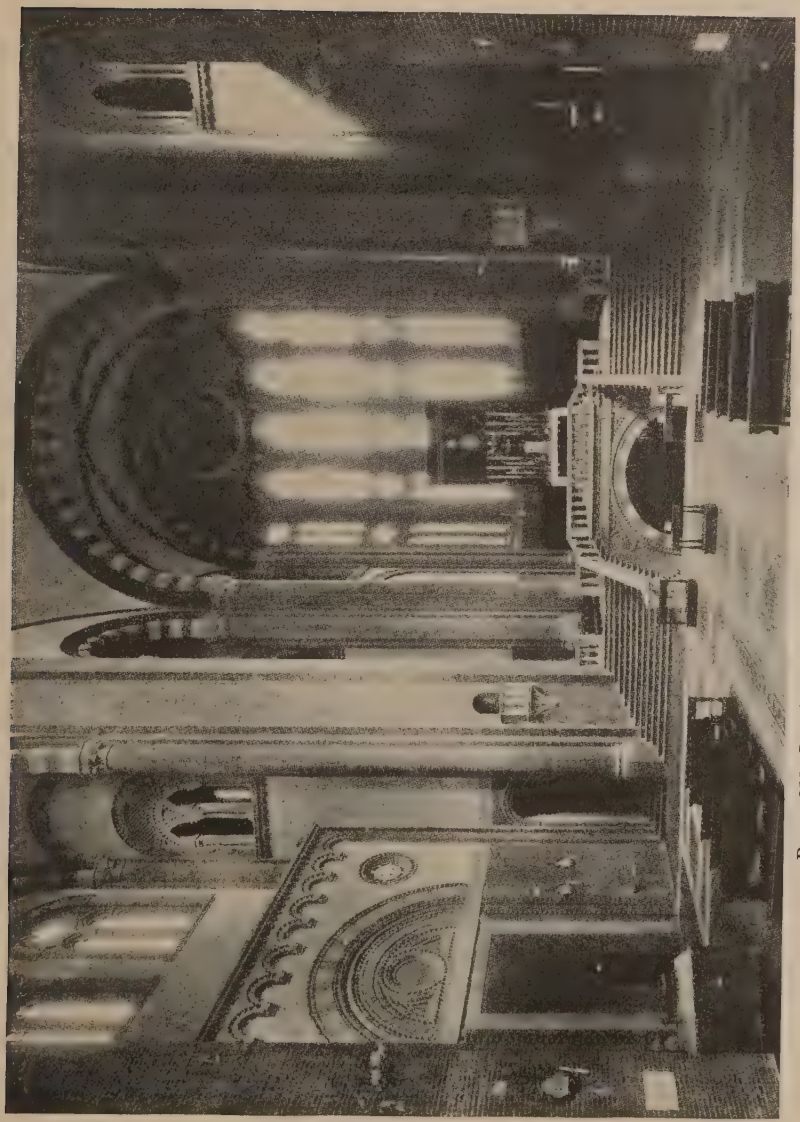

PLATE 311. Interior of the Church of the Sacred Heart, Bologna.

PLATE 312. San Martino Maggiore, Bologna.

PLATE 313. Façade of Sant' Eustorgio, Milan.

PLATE 314. Side View and Tower of Sant' Eustorgio, Milan.

PLATE 315. San Babila, Milan.

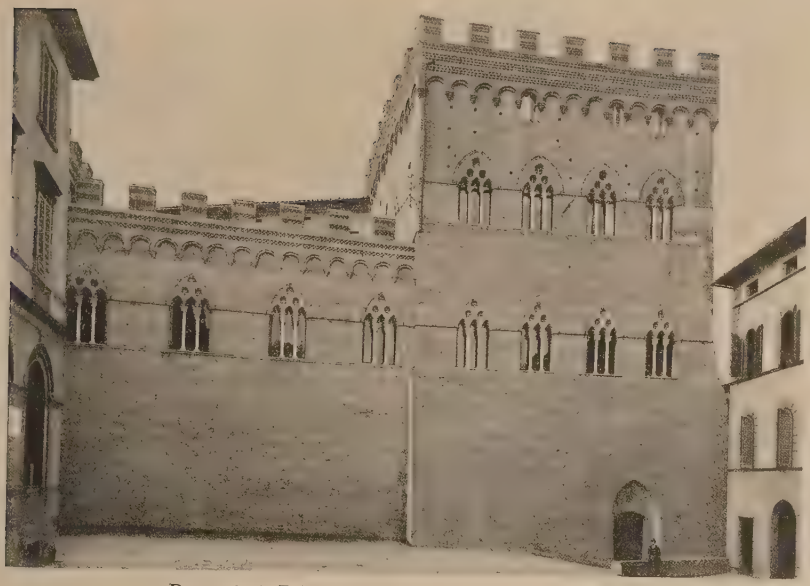

PLATE 316. Palazzo Salimbeni, "La Rocca", Siena.

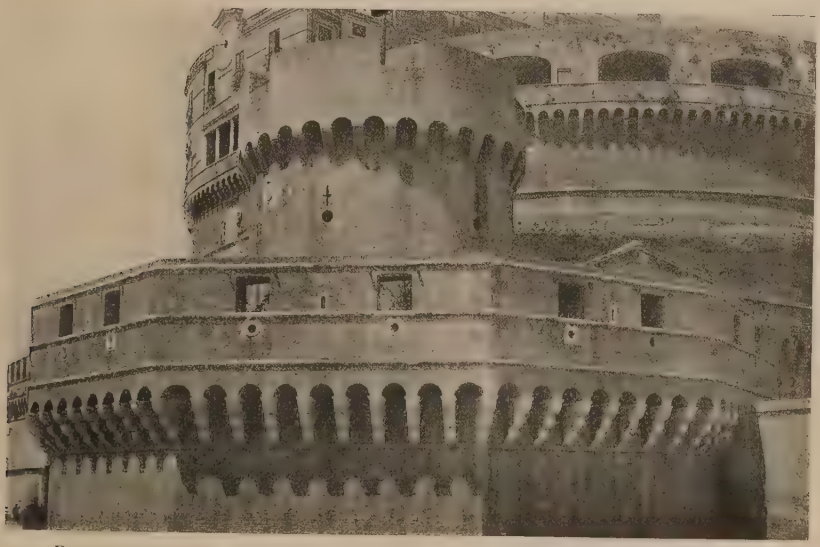

PLATE 317. Hadrian's Tomb, after 537 A. D. the Castel Sant' Angelo, Rome.

PLATE 318. Palazzo Medici, now Banca d'Italia, Asti.

The interior (Plate 311) affords a most impressive religious feeling in the quiet reflections of the red brick, which soften the liveliness of the light, at times is a little bold.

Restorations

In restorations, a form of art which has attained in these last years, above all through the work persistently prosecuted by Prof. Gustavo Giovannoni, a perfection up to the present unknown, we have work in which brick has often taken a predominant part, as in the façade of *San Martino Maggiore* in Bologna (Plate 312). Here we have an evident progress beyond the work done by Architect Brocca, in 1863-65, in restoring *Sant' Eustorgio* at Milan (Plates 313, 314). Among the more recent restorations in which brick have had a large use is the reconstruction of the façade of *Santo Stefano* at Bologna (Plates 121, 319) with not too much respect for the most probable lines, due to Collamarini.

Plate 319. Court of Pilate and San Sepolcro, Bologna.

The new pseudo-Romanesque front of *San Babila*, a frequently restored little Romanesque church of the XII century, makes a bright and interesting spot, amid the busy scenes along the great Corso Venezia at Milan (Plate 315). At Siena, the rear of the Salimbeni Palace, known as the *Rocca*, on the Via dei Rossi (Plate 316), shows an excellent Gothic restoration done by Partini in 1879. The modern brickwork on the ancient and famous *Castel Sant' Angelo*, Rome, originally the tomb of Hadrian, under the direction of Gen. Mariano Borgatti, represents, as seen in Plate 317, a restoration of the outworks added to the famous monument by the Popes in the XVI century. A very excellent reproduction of late Gothic in beautiful brickwork is found in the *Palazzo Medici* at Asti, used as the Bank of Italy (Plate 318). Finally, we place among the notable reconstructions, most carefully done by Piacentini, that of the Campanile at Venice, completed in 1912 (Plate 320).

In concluding so brief a collection of recent examples in brickwork, we do not believe that we are able to reflect always the most vital expression of our modern activity which refines more and more into a persistent effort to free from all insincerity the real path to the attainment of pure and living forms of art. Among the vast number of possible productions from which to choose, we have taken the more striking examples such as readily claim attention without pretending that our selections are always the most significant.

PROF. ING. ENRICO VERDOZZI

PLATE 320. Campanile of St. Mark's, Venice.

MODERN AND MEDIEVAL ITALY

Tints show Italy in XII century

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As Italian is not so familiar to the general American reader as French or German, a few suggestions may be useful.

Italian pronunciation, as in German, is very rational because every letter in the word is pronounced, and pronounced uniformly in similar situations. Spelling in both German and Italian is as near phonetic as possible. But unlike German, Italian sounds are simple and easy to form. There are, however, two real difficulties in Italian pronunciation for the foreigner. First, the distinction of letter sounds in certain situations, as hard and soft *s* and *z*, open and closed *e* and *o*, and shortened vowels in the current of speech. All such distinctions can only be learned by ear in associating with cultivated Italians who indeed differ among themselves regionally, very much as do educated people, for example, from Massachusetts and Virginia. Secondly, the accent or stressed syllable. For the most part, Italian words take the stress on the penult or second syllable from the end. This, as well as the gender of words, must be learned by experience in hearing educated Italians or in consulting the dictionary. The diaeresis is not needed in Italian as conjoined vowels are always separately pronounced. The grave accent is the only accent mark used in Italian; it either shows the stress on the final syllable or distinguishes two similarly spelled words with different meanings. In the Index, the accent of Italian words will be indicated only when it falls on the antepenult.

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The following notations may aid the reader in approximating the pronunciation of Italian words:

a, as in *a*ther; **e**, as in fete; **i**, as in p*i*que; **o**, as in n*o*te; **u**, as in cr*u*de. **j** is little used as it is only another form of **i**.

Consonants in Italian have the same value as in English except the following:

c, before e and i, =**ch** as in *ch*urch
ch, before e and i, =**c** as in *c*ab
g, before e and i, =**j** as in *j*ibe
gh, before e and i, =**g** as in *g*ab
sc, before e and i, =**sh**
sch, before e and i, =**sk**
gn, between vowels, =**ny** or as **ni** in un*i*on, with rare exceptions
gl, between vowels, =**ly** or as **li** in mil*li*on, with rare exceptions
gu, =**goo**, as *goo*ardo (guardo), not gardo
h has no sound, but is used to distinguish like words of different meanings, or to harden *c* and *g* before *e* or *i*.
k, **w**, **x**, **y**, disappear except as found in a few adopted foreign words.

These suggestions belong merely to the mechanics of the language. The art of speaking it depends upon its proper intonation, or the melody of phrase and sentence, which is only acquired by long association with those who are to the manner born. Such refinements, however, are not needed either to understand or to be understood.

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Designed and Executed by
Columbian Colortype Company
Chicago

DATE DUE

UCR JAN 6 1986
UCR APR 1 1986
MAY 25 1986 E
JAN 30 1997

GAYLORD PRINTED IN U.S.A.

13000